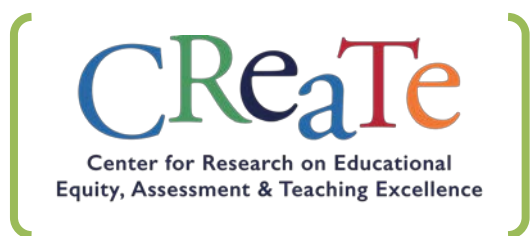




CREATE STEM Success Initiative Year 2 2014 – 2015



UC SAN DIEGO
CENTER FOR RESEARCH ON
EDUCATIONAL EQUITY, ASSESSMENT &
TEACHING EXCELLENCE

<http://create.ucsd.edu>

CREATE STEM Success Initiative: Year 2 Executive Summary

What is the CREATE STEM Success Initiative?

How can a public university leverage its resources to benefit public education on *and* off its campus, linking research, teaching and service to support education in a region from kindergarten through graduate school? The University of California San Diego's CREATE STEM Success Initiative (CSSI) is a visionary collective effort that links faculty, staff and students with the San Diego education community in a shared effort to support K-20 STEM (science, technology, engineering and mathematics) education in the region.

Launched by UC San Diego Chancellor Pradeep Khosla in July 2013, the CSSI supports core staff at the Center for Research on Educational Equity, Assessment, and Teaching Excellence (CREATE) to work with campus and community partners to design outreach and education projects that help plug "leaks" in the regional pipeline to STEM skills, degrees, and jobs. In the campus initiative's first two years, the CREATE CSSI team has supported **more than 200 distinct projects** helping campus and community partners to co-design, deliver, and assess high-quality K-20 STEM education efforts. Each project leverages campus resources to support underrepresented students to acquire STEM skills now essential for college and career.

In two years of working as a broader impact infrastructure supporting campus and community, CREATE staff have helped colleagues publicly realize UC San Diego's mission as a student-centered, research-focused, service-oriented public institution that provides opportunity for young people both on campus and off.

How Does the CREATE STEM Success Initiative Work?

The Initiative is forging a *sustainable and replicable* way to leverage and network a university's resources in public education K-20. The campus funds core staff that a) already know K-20 partners in the region, b) deeply understand the region's educational needs, and c) have skills in education research and evaluation. In turn, these core staff support university faculty, staff and students to make deep local impact with their research, expertise, energy, and grants.

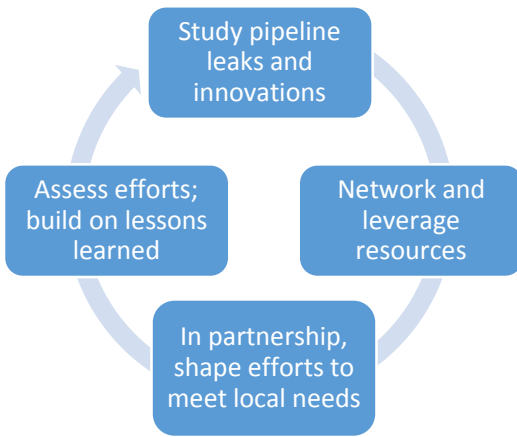
CSSI staff are helping partners across campus and community to:

- Study pipeline leaks and innovations.

- Network and leverage UC San Diego's resources to help "plug" leaks and spread innovations.

- In partnership, create and shape UC San Diego STEM efforts supporting high-need students (K-20), educators, and community programs.

- Assess efforts; build on lessons learned

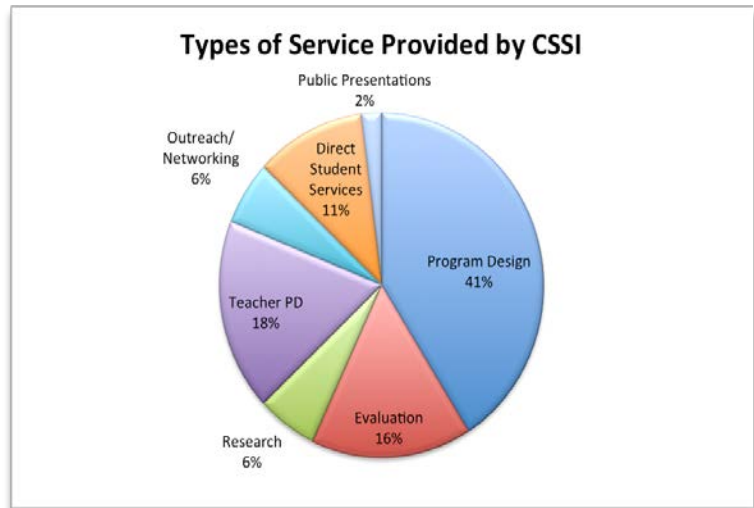


Crucially, the CSSI seeks to support campus partners not just to do “more” outreach, but to do outreach and education activities that actually plug pipeline leaks hindering STEM skills, course completion and degrees. We’re pinpointing learning opportunities our region’s students need and networking university resources with local partners’ to create those opportunities.

What Have We Accomplished?

In just 2 years, CREATE has helped expand the participation of UC San Diego faculty, students and staff in hundreds of new efforts to help K-20 partners innovate and spread work to plug the most troubling “leaks” in the region’s STEM pipeline, catalyzing new opportunities for thousands of underrepresented students and educators. We’ve helped colleagues write, submit, evaluate, and/or execute **72 grants, contracts, and funded projects** with campus and community partners to support K-20 STEM education efforts serving the region’s highest-need populations. In this, we’ve aided successful grant applications via well-constructed outreach and evaluation plans now demanded by funders.

As a return on investment, CSSI staff – funded by an initial investment of \$330,000/year – have already **helped UC San Diego colleagues bring more than \$2.6M to campus to date (\$694,381 in indirect costs) with nearly \$76.2M in pending grant applications.** Of the pending applications, roughly half (53%) are STEM research grants with education outreach components and 47% are direct grants/contracts to improve STEM education in our region. Funding supports STEM education projects with K-12 and campus partners; with our involvement, an additional \$613,000 went to community partners for new STEM education projects forged in collaboration with UC San Diego faculty, staff and students.



The CSSI has also forged new relationships with philanthropy and industry organizations and federal agencies now funding collective projects between UC San Diego and K-16 partners. Beyond our work on the 72 grants, contracts, and funded projects, just two years in, we’ve helped on **roughly 129 additional STEM education projects** that **have linked campus faculty, students and staff to community partners** for a priceless payoff: transforming the campus role in our community. Many CSSI projects include lead partners from industry, community

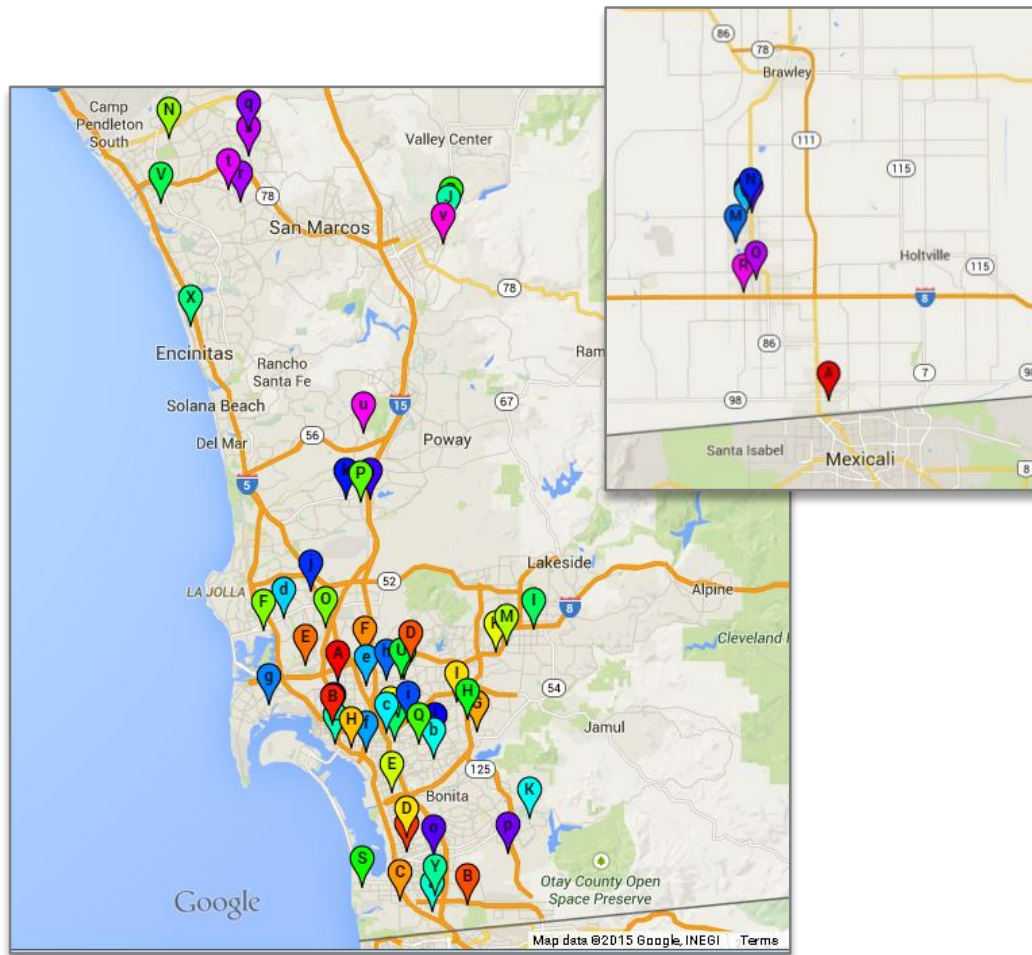
non-profits, school districts, county offices of education, and informal education organizations, who increasingly see UC San Diego as a key partner in supporting local education.

Our goal is to achieve truly broad and deep local impact with UC San Diego resources, while recognizing university stakeholders' time limitations and personal preferences. We have outreach models underway in the CSSI that involve UC San Diego faculty, staff and students in efforts not requiring many hours of time investment by faculty alone. Particularly, our CSSI outreach models prioritize investment in groups of teachers so they can spread UC San Diego content and resources to other teachers and students in our region. New innovative professional development efforts designed in the CSSI are supporting hundreds of teachers to improve critical aspects of math, science, technology and engineering instruction. Our efforts also design ways for UC San Diego students to do the outreach so they can learn to communicate publicly themselves. In addition, new CSSI experiential learning programs are sending UC San Diego students into the highest-need K-12 schools and community organizations to offer the most-needed supports while learning about the local community. Still other CSSI efforts design infrastructure for broader impact in our community, like transportation schedules, vans, and databases to track work and progress.

Essentially, in the CSSI, colleagues across campus and K-16 community are designing new ways to leverage universities for K-20 equity efforts in public education.

Who Have We Served on Campus and in the Community?

The CSSI effort is campus-wide as well as community-wide: CREATE is serving as an education outreach and assessment support center for UC San Diego, and CSSI staff work with all UC San Diego entities including Academic Divisions, the Scripps Institution of Oceanography, the School of Medicine, the Jacobs School of Engineering, Student Affairs, the Chancellor's Office, Development, the six UC San Diego Colleges, and Organized Research Units. We link UC San Diego faculty, staff, and students to colleagues in the **regional education community** (e.g., educators across the region's most diverse school districts; the San Diego County Office of Education), **local industry** (e.g., Qualcomm, SPAWAR), **philanthropic agencies** (e.g., Price Philanthropies, Weil Family Foundation), **community organizations** (e.g., Groundwork Chollas Creek, San Diego Rotary, Libraries, Rise-Up, Clairemont Outdoor Education Committee, PIQUE, United Way Children's Initiative, Outdoor Education for Rose Canyon, Earth Lab, BEST), **informal science institutions** (e.g., Balboa Park Museums, Elementary Institute of Science) and **state/national education organizations**. A number of projects include partners from the **UC Office of the President**, as we work to link the campus to the broader San Diego community.



Where are We Working?

Our collective campus initiative supports core staff to help colleagues leverage university resources to support the highest-need schools, educators, students, and community programs in our region.

The Continuing Need

Before CSSI, UC San Diego PIs and students typically figured out outreach efforts, “broader impact” or education plans for grants, and K-12 service efforts on their own. It’s now clear that campuses need *support organizations* to help university stakeholders figure out how to do outreach and design education plans for grants in limited time with the most benefits to both university and K-12. PIs also need help evaluating how the work is going. CREATE is a center composed of sub-organizations and individuals linked to thousands of the region’s educators, underrepresented students and community organizations. We also have a staff of experienced, equity-focused researchers (see create.ucsd.edu). CREATE has longstanding expertise in education program design, research/evaluation, grant application, teacher

development, and student college assistance. For these reasons, we're acting as a support organization helping campus colleagues work toward truly broad community impact.

In sum, CSSI efforts are unleashing the energies of UC San Diego faculty, students and staff in efforts to catalyze new learning opportunities for literally thousands of underrepresented students and educators. CSSI research staff are supporting professors in broader impact design, grant application, and evaluation, bringing research dollars and findings to campus and community partners. And CSSI staff are helping PIs, students, and staff ensure that their "outreach" efforts actually address critical gaps in K-16 education that prevent low-income, first-generation students from entering and completing higher education – even while outreach efforts also support the learning, teaching and research of UCSD faculty and students. That's making the most of university resources in a university's backyard.

Highlights of our work are detailed in this report.

All our best,

A handwritten signature in black ink, appearing to read "Mica".

Mica Pollock

Director, CREATE (Center for Research on Educational Equity, Assessment, and Teaching Excellence)

Professor, Department of Education Studies

(With hundreds of our colleagues at UC San Diego and in the San Diego region)

CREATE STEM Success Initiative Highlights, Years 1 & 2

CSSI Grant Design, Outreach and Research

As a group of locally connected researchers and practitioners, CREATE staff support colleagues on and off campus (including local K-12 schools and community colleges) to design, research and assess strategic programs to support first-generation, low-income college students through STEM skills and courses. In the past two years, we've helped dozens of UC San Diego faculty and postdocs conceptualize and submit outreach/education and broader impact plans for more competitive grants, matching outreach design to local education needs.

CREATE staff have supported funders' visits, written letters of support, linked colleagues to school districts for broader impact planning, and served in key PI and support roles on grants.



Pipeline Leak: High School Computer Science

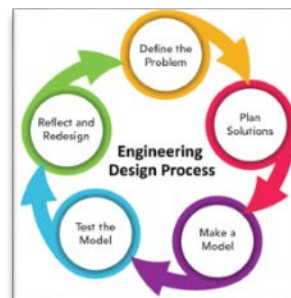
Computer science skills are perhaps today's most coveted STEM skills.

In collaboration with the UC San Diego Supercomputer Center (SDSC) and UC San Diego's Department of Computer Science and Engineering (CSE), CREATE is supporting computer science learning in Sweetwater, Vista, and San Diego Unified School Districts. [CREATE helped SDSC and CSE colleagues win a \\$1M NSF STEM-C](#)

[grant \("CS-CaVE"\)](#) in January 2015 that is now providing support for sustained district-wide professional development for implementation of AP Computer Science Principles. So far, more than 60 middle and high school teachers from schools and districts serving low-income, historically underserved youth have engaged in CaVE trainings. We are researching how the training actually shapes teaching in the classroom and ultimately affects students. CREATE is supporting the implementation of this effort and studying how these three local districts address the rapidly changing challenge of teaching computer science to all students, so that the rest of the nation, via NSF networks, might learn from their efforts.

Pipeline Leak: K-8 Physical Science and Engineering

Employers, federal agencies and teachers agree: engaging young people in engineering is a key STEM priority. New standards called the Next Generation Science Standards (NGSS) ask classroom teachers to engage students in engineering design processes. Many teachers are encountering engineering for the first time. In a new state-funded [POWER Grant funded in the CSSI](#), a team including CREATE staff and professors from UC San Diego Physics and Engineering are planning and delivering professional



development to 70 K-8 teachers from National School District, Chula Vista Elementary School District, and Sweetwater Union High School District to increase teacher understanding of NGSS Physical Science and Engineering. Through teachers, the project will reach hundreds of low-income students new to engineering and physical sciences.

The project complements and builds on CREATE work to support elementary teachers in engineering design in partnership with Qualcomm's new Qcamp programming, which we helped design and launch in summer 2014. Also in summer 2014, SPAWAR Systems Center Pacific funded a Next Generation [STEM Engineering Program](#) for middle school teachers in partnership with the San Diego Science Project (In CREATE) and the San Diego County Office of Education, with Jacobs School of Engineering staff and UC San Diego alum Jim Rohr. The effort included a five-day summer institute and three school year follow up days of professional development. This program supported 30 initial 6th-8th grade teachers to explore the NGSS with an emphasis on integrating mathematics and engineering in the classroom.

Relatedly, CREATE staff have partnered with Jacobs School of Engineering colleagues to expand existing outreach to San Diego's highest-need locations. As part of a new effort by the Jacobs School of Engineering SEISMIC Outreach program for schools "South of the 8," CSSI staff partnered to bring structural engineering faculty to meet the Chula Vista Elementary School District (CVESD) superintendent and Feaster Edison School leadership team to launch their schools' inaugural participation in the program. Undergraduates now support the schools' classrooms in learning structural engineering prior to a culminating field trip to UC San Diego. Teachers presented their engineering efforts to great acclaim at the May 2, 2015 Common Core conference at UC San Diego.

Dear Mica,
You are special to the team. I am so glad that you agreed to take the lead for the Pre-college program!
Since you are so great to work with, I will "bother" you more in the future. Thank you so much!!!

-Shaochen
Shaochen Chen, PhD
Professor and Vice Chair of NanoEngineering Department
Co-Director of Biomaterials and Tissue Engineering Center
Institute of Engineering in Medicine

From: Sharon Franks
Date: November 6, 2014 at 8:34:42 PM PST
Subject: Re: Great job!

Hi Mica,
I share Shaochen's sentiments that you and CREATE are a great asset to the team. Many thanks for all the sustained effort and positive energy you have invested in helping NanoADAPT succeed. Like you, I think the team did an outstanding job at the site visit. Exciting times for all!

All the best,
Sharon
Sharon E. R. Franks, Ph.D.
Director, Research Proposal Development Service
Office of Research Affairs

From: "Rohr, James J CIV SPAWARSYSCEN-PACIFIC, 72110"

Date: December 15, 2014 at 1:18:41 PM PST

To: John Yochelson, Susan Yonezawa

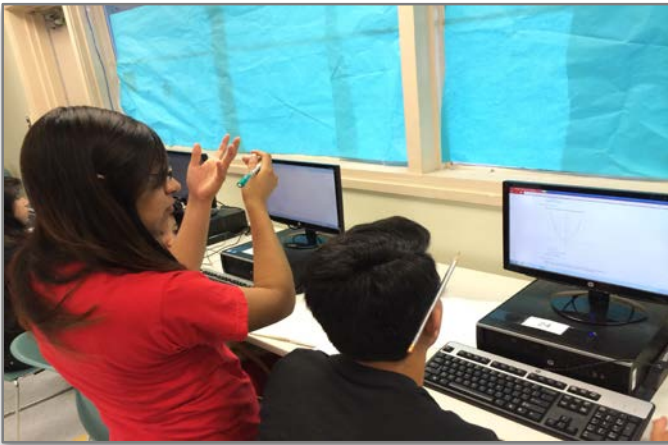
Subject: RE: Reporting on 2014 UCSD-CREATE activities with BEST Support

Just confirming that CREATE has completed WITH DISTINCTION the efforts proposed in the original statement of work. Moreover, they have served to connect us (SSC Pacific in San Diego) with a cohort of excellent middle school teachers who are interested to continue to work with us as well as like-minded educators at the Reuben H. Fleet Center. In various ways through SSC Pacific STEM professionals and/or summer institute teachers, thousands of students have benefited from the institute through classroom presentations and demonstrations. Moreover, there is the reasonable hope that teachers will continue to as CREATE has built a website from which teachers can draw presentations, demonstration instructions, videos....

Cheers and Happy Holidays - Jim

Pipeline Leak: Algebra II

We've come to call mathematics the Achilles Heel of the STEM pipeline today: if you can't pass Algebra II, you likely won't earn a BA degree in any subject.



For the past two summers, in collaboration with UCSD's Early Academic Outreach Program (EAOP) and the University of California Office of the President, CREATE has helped to study and scale UCSD EAOP's pilot program offering credit-bearing, college-prep (A-G), UC-designed online courses in "blended" (human-supported) summer school classrooms to fill transcript gaps for low-income students in southeast San Diego and the Imperial Valley. In 2013, CREATE researchers, including UC San Diego

doctoral and undergraduate students, studied EAOP's "blended" model for offering the courses to 200 students in shared classrooms with in-person supports from teachers and tutors. The project turned into a 2013 public research report and a UCOP-funded statewide scale-up for summer 2014 ([SummerUP](#)), with EAOP programs on all the UC campuses offering blended Algebra II courses reaching nearly 200 more students statewide. CREATE's 2014 study focused on the in-person human supports and "math talk" students needed to succeed in the courses. SummerUP 2015 has EAOP providing yet more Algebra II courses statewide, with CREATE supporting teacher training and basic evaluation.

With CREATE doctoral student support, we also helped EAOP pilot test an [online math tutoring program](#) for UC San Diego undergrads to support elementary school students remotely at the Logan Heights Public

Library. We also supported TRIO/Upward Bound to research its summer residential program to pinpoint measurable gains.

Pipeline Leak: Community College Developmental Math

Statewide, every additional remedial math course taken in community college lowers students' chances of completing a certificate or degree by more than 20 percent. Many never complete the remedial mathematics required to transfer to universities.

In summer 2014, with [Price Philanthropies](#), CREATE and UC San Diego colleagues designed and studied a pilot program to support and accelerate low income, first generation community college students (formerly from San Diego Unified) through the mathematics sequence of developmental courses (Pre-Algebra/Geometry & Geometry/Algebra II) at San Diego City College. The program involved support from UC San Diego K-12 Extension, Department of Education Studies doctoral students, the Department of Mathematics' Mathematics Diagnostic Testing Project (MDTP), and Math for America San Diego (MfA SD) and its affiliated university staff and highly trained teachers. In a Summer 2014 Accelerated Developmental Math Course for 22 Price Scholars at SDCC, 22 students passed a total of 23 course levels in math. In summer 2015, with evaluation support from the UC San Diego Yankelovich Center for Social Science Research, CREATE and partners will be testing and evaluating a scaled-up version of the model across SDCC.



I am so excited about all of this great work that I can barely sit in my chair. To think that our small pilot project with CREATE, USCD extension, SDCC Math Dept. and Price last year could be the seed that will germinate this marvelous garden of abundance for our SDCC students is very exciting. This again validates how well things can be for all of us when we collaborate and share resources and expertise.

Thank you all for all of your hard work on the continuing success of this worthy effort to improve the success of our students in the Gatekeeper courses.

Mariaelena Delgado, M.A.
Price Scholarship Program Director



Pipeline Leak: Hands-On Extracurricular STEM Experiences, K-12

With thousands of projected job opportunities in STEM-related fields, CSSI staff help support collective campus-community efforts that promote and inspire STEM learning in our region.



Sometimes, colleagues already have outreach in progress and want to link it to who needs it most. CSSI staff have linked UC San Diego faculty, students and staff to some of the highest-need schools, educators, students, and community programs in our region and supported UC San Diego faculty, staff, and students into well-attended community STEM events expanding the university's relationships across the San Diego and Imperial Valley region.

As one example, [Ciencia e Ingeniería con la Familia and Engineering with the Family](#) is a highly accessible, on, Spanish-based event designed to encourage in education and careers in the STEM fields. The scalable model, is now a collaborative CSSI effort CREATE staff, SPAWAR professionals (Space and Naval Systems Command), SHPE members (Society of Professional Engineers) at UC San Diego and UC Irvine, Diego State (SDSU) and Long Beach State Universities, MAES chapter (Latinos in Science and Engineering) at Ciencia e Ingeniería con la Familia is presented in Spanish to facilitate communication with family members and held at schools and community centers work and on weekends. The event is an opportunity students and their parents to see, interact with, and inspired by Latino/a young men and women who are pursuing an education in engineering and other STEM fields. Five expos were held this past year with more than 500 students and families in attendance.



(Science hands-interest event, a linking Warfare Hispanic San and the SDSU. entirely after for become

From: "Rohr, James J CIV SPAWARSYSCEN-PACIFIC, 72110"
Subject: Dominga hits a home run (twice)
Date: November 21, 2014 11:15:26 AM PST
To: "Yonezawa, Susan

Just wanted you to know that I was at two Spanish days/nights this week and Dominga did an excellent job. Attendance was great and dozens of volunteers for SHPE and MAES from UCSD, SDSU. Thanks for making that connection. Cheers, Jim

As another example, [STEM Fest](#) is a new Vista Unified School District effort created with our Vista CSSI liaison, designed to build awareness of STEM education and careers in the Vista community by showcasing a vast array of student projects and presentations.



For two years, CSSI program partners from divisions and departments across UC San Diego have supported the new annual festival to help kids and parents experience exciting STEM concepts first-hand.

Here, Director of Scripps Educational Alliances Cheryl Peach and her crew of graduate students from the Scripps Institution of Oceanography at the 2014 STEM Fest helped children and adults experience tiny glowing algae from the sea.

The CREATE STEM Success Initiative is fulfilling an extremely important role at UC San Diego by unifying and informing the outreach efforts of departments across the institution. It has been a pleasure to work collaboratively under the CSSI umbrella. The collaboration has proven to be a productive means of extending the work we have been doing at Scripps to a broader audience, providing access to expertise essential to high quality outreach, and establishing communication channels that connect outreach providers at UC San Diego in a way that has not happened before the CSSI was established.

Cheryl Peach, Ph.D.
Director, Scripps Educational Alliances
Scripps Institution of Oceanography, UCSD



Pipeline Leak: K-12 Scientific Inquiry

CSSI projects seek to engage learners of multiple ages –often simultaneously!

As part of the National Science Foundation’s *Using STEM America Project*, high school and elementary teachers from the Imperial Unified School District worked with high school students in science by placing them in a mentoring and teaching role for younger students. Imperial High School students, aka the “Explainers,” donned lab coats and guided groups of second graders through a variety of exciting, hands-on science activities based on the Next Generation Science Standards. The project was part of the new [Imperial Valley Discovery Zone](#) connecting high school students with elementary students for teaching hands-on science. More than 300 students participated. CREATE facilitated the project partnership between Dr. Carlos Coimbra, UC San Diego associate professor of Mechanical and Aerospace Engineering at the Jacobs School of Engineering, the Imperial Valley Regional Occupational Programs Office, the Imperial Unified School District and the science museums in Balboa Park. The San Diego Science Project, in CREATE, offered Imperial Unified School District science teachers immersion in Next Generation Science Standards instruction.

Pipeline Leak: The Need for *Smart* Tech Use, K-12

Tech use in STEM effort has the danger of defaulting to “more” is “better.” Throughout CSSI efforts, we’re studying and pinpointing tech uses that actually support student learning.

- With the support of the National Writing Project and Teaching Tolerance of the Southern Poverty Law Center, a CREATE-led initiative called [Smart Tech Use for Equity](#) is engaging a diverse group of K-12 teachers in trying tech uses and documenting their effects for students with equity in mind. In spring 2015, we launched the “Smart Tech Use for Equity” initiative with local educators, spearheaded by the San Diego Area Writing Project and CREATE. Participants are science teachers, math teachers, Special Education teachers, and teachers of English learners, as well as English teachers, from elementary through high school, each exploring tech use with low-income school populations. Each teacher explores an example of tech use with equity in mind, documents the effects for students, and creates a product sharing their learning with next teachers.

- As another example, in a Lemon Grove [DoDEA grant](#), CREATE is helping educators figure out how to incorporate technology-driven learning into 5th – 8th grade classrooms to improve math and science learning and achievement.
- We’ve supported Jacobs School of Engineering faculty in testing the STEM skill effects of an iPad app for [Spatial Visualization](#), designed to boost the mental representation and manipulation of 2-D and 3-D shapes. This effort has involved 23 Preuss students and their teacher, in addition to piloting a course for undergraduate students using the software.
- CSSI researchers (including UC San Diego doctoral students) are now researching a [new calculator created by Calit2 staff](#), with students at Preuss, Lincoln and La Jolla High Schools, and Helix Charter High School.

Pipeline leak: Community college transfer and UC San Diego retention

CREATE is supporting UC San Diego faculty to plug “leaks” in the pipeline to and on our own campus, with the goal of better recruiting and retaining students and shortening time to degree.

- CREATE helped link the [STARS program](#), part of the [Frontiers of Innovation](#) campus initiative, to community college contacts (Southwestern, Imperial Valley College, and San Diego City College) to recruit students to apply for paid summer 2015 lab experiences with UC San Diego faculty.
- Other CSSI research projects are supporting UC San Diego colleagues to understand how [summer bridge and summer research programs](#) work to influence STEM students from high schools, community colleges, and UC San Diego's own campus.

CSSI Teacher Development

When you invest in teachers, you invest in the STEM skills of a region. As a key CSSI focus, we’ve helped UC San Diego faculty, graduate students and staff invest their outreach time, dollars and expertise directly in the development of teacher leaders who network that expertise to other teachers in the San Diego region. In just two years, new opportunities created in the CSSI have supported thousands of local teachers to transition to the Common Core State Standards and the Next Generation Science Standards, all of which require deep STEM inquiry.

[Diving Deep: Transforming Educational Practice for All Students through CCSS/NGSS](#) was a second annual one day conference developed and hosted in May 2015 by UC San Diego’s Department of Education Studies



(EDS) and CREATE, again attracting **300 K-20 educators** from the region to Pepper Canyon Hall at UC San Diego for a vibrant day of educator-educator learning. CREATE, along with the San Diego County Office of Education, California Department of Education and San Diego Science Project, additionally co-hosted a two-day NGSS Rollout conference in spring 2015 at the Price Center for **205 regional science teachers**.

Pipeline Leak: Secondary Mathematics

The sea change in teaching called for by the Common Core State Standards – Mathematics is dramatic, and for many teachers it can be overwhelming.

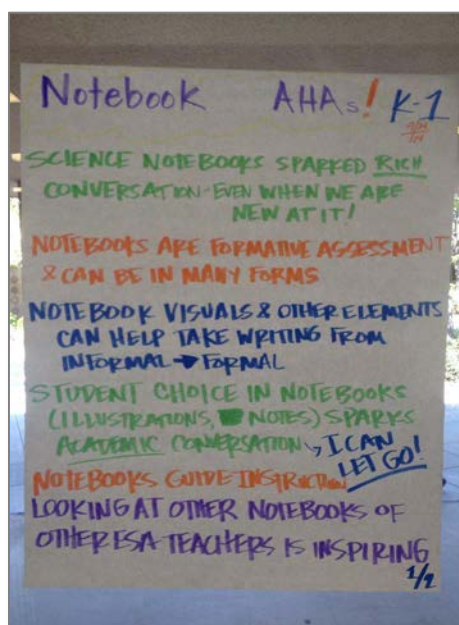
The [Teacher Leader Collaborative](#) is a new professional development program created under the CSSI for middle and high school mathematics teachers. A collaboration between Math for America San Diego, UC San Diego Extension and CREATE, the TLC brought San Diego Unified School District teachers together to share new knowledge and strategies for working with the Common Core State Standards - Mathematics. In addition to rich mathematics professional development engaging teachers in doing math, each 2014-15 TLC session featured prominent mathematicians, including professors from the UC San Diego Department of Mathematics. This year, more than 40 SDUSD mathematics teachers participated in TLC's monthly sessions.



Pipeline Leak: K-6 Scientific Inquiry

Because thinking like a scientist starts early, CSSI projects often invest strategically in elementary science teaching.

The [Elementary Science Academy](#) (ESA) has become a yearlong professional development program, so far reaching more than 160 kindergarten through fifth grade (K-5) teachers from the San Diego area. In partnership with the San Diego County Office of Education, the San Diego Science Project (SDSP, in CREATE) spent three weeks in summer 2014 working closely with teachers from across San Diego County (particularly Chula Vista) as they explored new approaches for teaching science, including ways to implement Next Generation Science Standards into classroom instruction. The SDSP is also leveraging a partnership with the San Diego County Office of Education to support elementary-level STEM



transformation to NGSS, with summer 2015 institutes planned for dozens of additional teachers.

Pipeline Leak: Secondary Scientific Inquiry

A key CSSI goal is to support UC San Diego faculty and grad students to work with K-12 teachers to design K-12 applications of cutting-edge UCSD science. In particular, we link graduate students and teachers in mutually beneficial efforts to “communicate UCSD science.”



Recent examples of grad student-teacher collaborations spearheaded by CSSI staff include UC San Diego Biology graduate students working with teachers measuring cacti and considering pollinators; Physics grad students working with teachers to discuss what it means to make a physical or visual representation of air and particles (a model); a Biology grad student and postdoc working with teachers on a tool for teaching genetics and the genome; and Scripps grad students and earth science teachers discussing the evidence behind claims about the history of the planet. In increasing CSSI “lesson

study” efforts with professional development experts, teachers then develop, hone, and share out lessons based on the content, multiplying impact.

In collaboration with Director of Scripps Educational Alliances Cheryl Peach, for example, CSSI staff have co-designed and led teacher lesson study cycles with Scripps Institution of Oceanography faculty and graduate students, providing biology teachers with authentic science experiences they can use to create dynamic science classes for their students. Above, local biology teachers look at Antarctic marine invertebrates and the role geography plays in connecting these populations from South America to Antarctica.

CSSI Student Experiential Learning Efforts

When UC San Diego students carry their campus-based learning into the K-16 community, they merge campus research, teaching, and service. In the CSSI, such efforts simultaneously engage UC San Diego students in their studies and in service learning. As the following examples show, we’ve helped colleagues create new experiential learning programs now sending more than 200 UC San Diego students annually into high-need K-12 schools.

Pipeline Leak/Service Learning Focus: Inquiry-based Science and Science Communication

New Next Generation Science Standards prioritize science talk and communication. We’re creating experiential learning efforts linking UC San Diego graduate and undergraduate students to K-12 teachers and students. These efforts also support UC San Diego students to learn to communicate science, essential for their career development.



As one example, CSSI staff helped UC San Diego professor Neal Devaraj write an outreach plan for his CAREER grant that now funds a new [Hands On Lab \(HOL\)](#) class hosted in Education Studies and run by the San Diego Science Project. In 2014, the HOL served 40 TRIO/Upward Bound Math & Science students and their teachers at Clairemont, Hoover, and Mission Bay High Schools, engaging STEM undergraduates in the hands-on teaching of science using Devaraj's content. Spring 2015 efforts have brought together UC San Diego undergrads with 50 more students from these high schools and Lincoln High School. Graduate students provide biochemistry content for the science lessons, while TRIO/Upward Bound Math & Science hosts additional enriching on-campus experiences including lab visits and conversations with UC San Diego students and faculty. Additionally, the San Diego Science Project has recruited high school teachers to participate in professional development for the Hands on Lab, enabling

teachers to carry UC San Diego content back to their own classrooms.

Pipeline Leak/Service Learning Focus: Secondary Mathematics

Algebra comprehension is one key "Achilles Heel" of the STEM pipeline. How can UC San Diego undergrads help out?

To leverage undergraduate mathematics know-how for local UC San Diego's Eleanor Roosevelt CSSI staff, and Math for America Diego in 2014 created the [ERC/CREATE Math Tutor Corps](#), a student outreach program supporting local high school students in Algebra. The new quarterly student service opportunity equips UC San Diego undergraduates with the



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new

knowledge and skills necessary for tutoring high school mathematics and provides real-world tutoring experience at San Diego's Lincoln High School, a UC San Diego partnership school and recipient of the Chancellor's Associates Scholarships. This year, six master teaching fellows from Math for America trained 29 undergraduates to support Lincoln High School math classes, helping to plug the major pipeline leak of Algebra competency. The project synchronizes efforts with other campus tutoring and mentoring

programs: this year 122 tutors headed to Preuss and 48 went to Gompers Preparatory Academy through [Thurgood Marshall College's longstanding intern course](#). In each of these efforts, the CSSI also hopes to feed the existing UC San Diego STEM educator pipeline into CalTeach; Partners at Learning, UC San Diego's largest service learning effort (Education Studies); and Education Studies credentials.

Pipeline Leak/Service Learning Focus: College Exposure and Advising

To get students through the pipeline to college, local schools also need support in an area critical to college access: college counseling.



A new [Muir College Academic Mentor Program](#) (CAMP), designed in collaboration with the Early Academic Outreach Program (EAOP), was formed to help local schools struggling with large counselor-student ratios (some reach 1-600). CAMP sent 24 students out this year to Castle Park, Clairemont, and King Chavez High Schools; San Diego High School of Science and Technology (SciTech); and Gompers Preparatory Academy as college counselor assistants. Since students take the

course for credit, EAOP's investment in the instructor multiplies to high quality service by many more students – a win-win situation for EAOP, UC San Diego students, and schools.

In our matchmaker role, CSSI staff supported [IMPACT](#), an exciting, cross-campus collaboration between



UC San Diego School of Medicine Center for Community Health and UC San Diego Athletics with the San Diego Unified School District. UCSD athletes head in teams to two low-income elementary schools. CSSI staff set up the initial connection between the School of Medicine and UCSD Athletics, who also were looking for ways to stretch their service to high need schools and communities in San Diego. CSSI staff also helped by organizing transportation for the athletes' weekly visits.

In fact, we've helped get [vans transporting students for service](#) to schools across the San Diego Unified School District and in Sweetwater, with the UC San Diego Center for Student Involvement and with funding from Student Affairs and the Weil Family Foundation. The vans transport UC San Diego riders to and from the university to various community service activities, particularly those in low-income communities.



I'm so impressed with CREATE's ability to turn words into action. We're so glad to be partnering with you. Without you, we would never hope to make the kind of giving impact we're currently enjoying.

Best ~

Kit

Kit-Victoria Wells

Team Liaison

Christopher Weil & Company

Hi Mica and Susan,

I hope this email finds you well. We're gearing up for the launch of the community service transportation program thanks to the collaborative efforts of each of you and Ryan and Tiveda! We're picking up our 3 community service vans tomorrow. Many thanks to you for assisting on the development of routes and partnering in the software that will allow the students to sign-up for the vans. This has been a wonderful collaborative partnership, and one that will allow more students to serve the community.

Thank you again! Here's to engaging more students in the community!

Emily Marx

Director, Center for Student Involvement

UC San Diego

CSSI Infrastructure

In addition to infrastructure like vans for school service, CSSI staff have been busy setting up database infrastructure allowing partners to know how young people are faring in STEM programming. Right now in San Diego, we have no way of knowing how students fare when they go from school to school or from K-12 to postsecondary education. So, we've laid the groundwork for a [K-20 data warehouse](#) with local

districts, higher education partners, and UC San Diego's Supercomputer Center, with the joint goal of analyzing de-identified data on the K-20 education pipeline in our region.

Supporting collective impact also requires communication infrastructure showcasing publicly what everyone is doing. CSSI staff have created dozens of [public communications](#) sharing UC San Diego's community efforts with the community and world. Visit our [blog](#), sign up for our [newsletter](#), and help us #createequity!



2014 UC San Diego Diversity Award recipients, including the entire CSSI staff team, on right (plus an additional award for CSSI Network Coordinator Susan Yonezawa, front row, right). The award recognizes individuals and groups that best represent equal opportunity/affirmative action and diversity efforts on campus and support the University's Principles of Community.

From: Wienhausen, Gabriele

Sent: Saturday, January 24, 2015 1:05 PM

To: Pollock, Mica; Abeyta, Edward; Baxter, Diane; Contreras, Frances; De Maio, Antonio; Peach, Cheryl; Thiemens, Mark; Tu, Charles; Datnow, Amanda; Remmel, Jeffrey; Rao, Ramesh - forward; Pamela Cosman

Cc: Millen, Susan; Ramona Mason; Yonezawa, Susan; Edwards, Barbara; Schulz, Kathryn; Dominga Sanchez; McClure, Larry; Sweet, Monica

Subject: RE: CREATE STEM Success Initiative Internal Advisory Board meeting

Congratulations to you and the CREATE STEM Success Initiative core staff team for receiving a Diversity Award at the UC San Diego Equal Opportunity/Affirmative Action!

Well deserved! It energizes all of us!

Gabriele



CREATE/CREATE STEM Success Initiative

Year 2 Communications 2014-2015

Communications

CREATE STEM Success Initiative Year 2

CREATE has supported a staff member to help CSSI participants and campus communications colleagues document the CSSI's projects to help broadcast UC San Diego efforts regionally and beyond.

Campus Media Placements

[The Power of Partnerships](#), This Week @ UC San Diego, Feb. 12, 2015

[20th Annual Diversity Awards Honor Commitment to Outreach, Inclusion and Community Building](#), This Week @ UC San Diego, Mar. 5, 2015

Education Publication citations

[The Role of Humans in Blended Learning](#), by Justin Reich, Education Week, May 26, 2014

CREATE Communications

Our blog, [UCSDCREATE](#) at Wordpress.com, featured numerous blog posts about Year 2 CSSI efforts.

[Mathematical Ways of Thinking: Summer Math Academies Spotlight Common Core Learning](#)

"Each day we ask ourselves, 'did the kids have a chance to think critically?' We try to shift the mathematics to the kids' point of view to elicit a student-produced solution, bringing them to the board and facilitating that kind [...]"

[Notebooks Inspire Students, Teachers in K-5 Science Learning](#)

By Cristina Trecha, Director, San Diego Science Project How do we create a classroom culture where students are at the center? What does it mean for students to develop a scientific explanation? What are the links between reading, writing, and science? [...]"

[Another Day at the Beach: Unearthing Clues to a Changing Planet](#)

By Cristina Trecha, Director, San Diego Science Project Only in California, or make that San Diego. On September 20, middle and high school science teachers hit the beach during record-breaking heat to study the "Snowball Earth" theory (how the [...]"

[GenePalette Provides a New Way for Students to Learn Science](#)

By Mica Pollock, Director, CREATE and Cristina Trecha, Director, San Diego Science Project The San Diego Science Project had teachers asking this question: Just what does it mean to "share" DNA with a banana? On Saturday, October 4, 2014, [...]"

[Common Core Math Coauthor Kicks Off Teacher Leader Collaborative](#)

"We found that the mathematics curriculum was a mile wide and an inch deep: it was an underachieving curriculum. It was not the students, it was not the teachers; it was what we were teaching. The way we wrote the previous [...]

[UC San Diego Team Supports College Readiness Efforts at "Achieve UC"](#)

Held this year at Castle Park High School in San Diego's South Bay, Achieve UC is a University of California system-wide initiative that offers essential academic and financial information to help students, especially those from low-income schools and districts, learn about [...]

[New UC San Diego Vans Support Student Outreach Programs](#)

Honk! Honk! All aboard! In an exciting new pilot investment of campus resources, three new bright and shiny eight-passenger vans are now available to UC San Diego students who are working as program volunteers or in course-related service. The vans [...]

["Ciencia e Ingeniería con la Familia" Preps Local Families for College](#)

Facing an immediate future where thousands of jobs will be available in STEM-related fields, UC San Diego's CREATE co-hosted two science and engineering expos to inspire middle school students and families to get a head start on college careers. Ciencia [...]

[Gaining New Perspectives in Transformational Geometry](#)

Darryl Yong explains the use of manipulatives for teaching geometry at MfA SD's Teacher Leader Collaborative Jan. 31. On most days, you'll likely find Darryl Yong, the well-regarded mathematics professor at Harvey Mudd College, teaching Ordinary Differential Equations or Numerical [...]

[Smart Tech Use for Equity](#)

By Mica Pollock, Kim Douillard, Mike Salamanca and Barb Montfort On January 28, 14 teachers crowded into the UC San Diego Faculty Club to ask a key question. Which uses of technology in schools help create equity, and which don't? [...]

[TRiO Talent Search Students Attend UC San Diego Kyoto Symposium](#)

TRiO Talent Search students and staff with Kyoto Symposium keynote speaker Dr. Edward Witten. A group of TRiO Talent Search students from Mount Miguel and El Cajon Valley High Schools spent an exceptional day at UC San Diego on March [...]

[This Week at UC San Diego: Lighting a Spark for Computer Programming](#)

A fine article today in This Week @UC San Diego featuring CREATE partners ThoughtSTEM and the San Diego Rotary. Together ThoughtSTEM and the Rotary are bringing exciting computer programming opportunities to three elementary schools and two middle schools in the City Heights [...]

[Richard Blum and Robert Reich Tour EarthLab, a UC Community Station](#)

UC Regent Richard Blum and Dr. Robert Reich visited EarthLab on April 13, a University of California Community Station and physical community “hub” for UCSD partnership work. EarthLab, developed by Groundwork San Diego, is a four-acre, community greenspace for outdoor, [...]

[Educators Dive Deep at Annual EDS/CREATE Conference](#)

Teachers explore an engineering design process for elementary students at “Diving Deep: Transforming Educational Practice for All Students through CCSS/NGSS” conference at UC San Diego. “When educators take a Saturday to learn together about new ways to support young people, [...]

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