UC San Diego

CREATE
Center for Research on Educational
Equity, Assessment & Teaching Excellence

CREATE
STEM Success
Initiative (CSSI)

UC San Diego CREATE STEM Success Initiative Year 8

In this pandemic year of crisis, we kept going strong to produce local opportunities to learn, never slowing in our service to the region's students and educators. We also grew national- and state-level programming and program models. Read below!

Executive Summary

The University of California San Diego's CREATE STEM Success Initiative (CSSI) is a collective, visionary, and sustained effort to leverage a university to create K-20 local opportunities to learn, supporting education on campus and off. 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 grants, outreach and education projects, broader impact plans, and research/evaluation projects meeting education needs on our campus and in the local community. The CSSI is highlighted in UC San Diego's Strategic Plan as a key campus effort to increase and coordinate "the impact, type, and number of community engagement efforts across the campus." CSSI efforts simultaneously support the learning, teaching, research, and grant efforts of UC San Diego faculty, staff, and students.

The CSSI seeks to support campus and community partners to design innovative education activities that offer critical education opportunities and close key opportunity gaps hindering K20 students' progress toward essential skills and degrees. Our projects spread necessary opportunities to learn, addressing opportunity barriers that particularly prevent low-income, first-generation students from entering and completing higher education and pursuing careers. The CSSI targets opportunity in STEM (Science, Technology, Engineering, and Math) because students experience particular opportunity gaps in STEM, actually blocking degrees and careers in many fields. Our model can be applied to leveraging a university in any subject area.

The CSSI is led by UC San Diego's Center for Research on Educational Equity, Assessment, and Teaching Excellence (CREATE). CSSI personnel at CREATE a) have strong networks of K-20 partners in the region, b) deeply understand the region's and campus' educational needs, and c) have expertise in program and professional development, education research, and evaluation. CREATE's sub-organizations link to thousands of the region's educators, underrepresented students, and community organizations. CREATE also houses experienced, equity-focused researchers and evaluators with extensive expertise in grant preparation, data analysis, and writing (see create.ucsd.edu).

CSSI-funded team members and the full team at CREATE provide a range of services to UC San Diego campus faculty, **staff and students**:
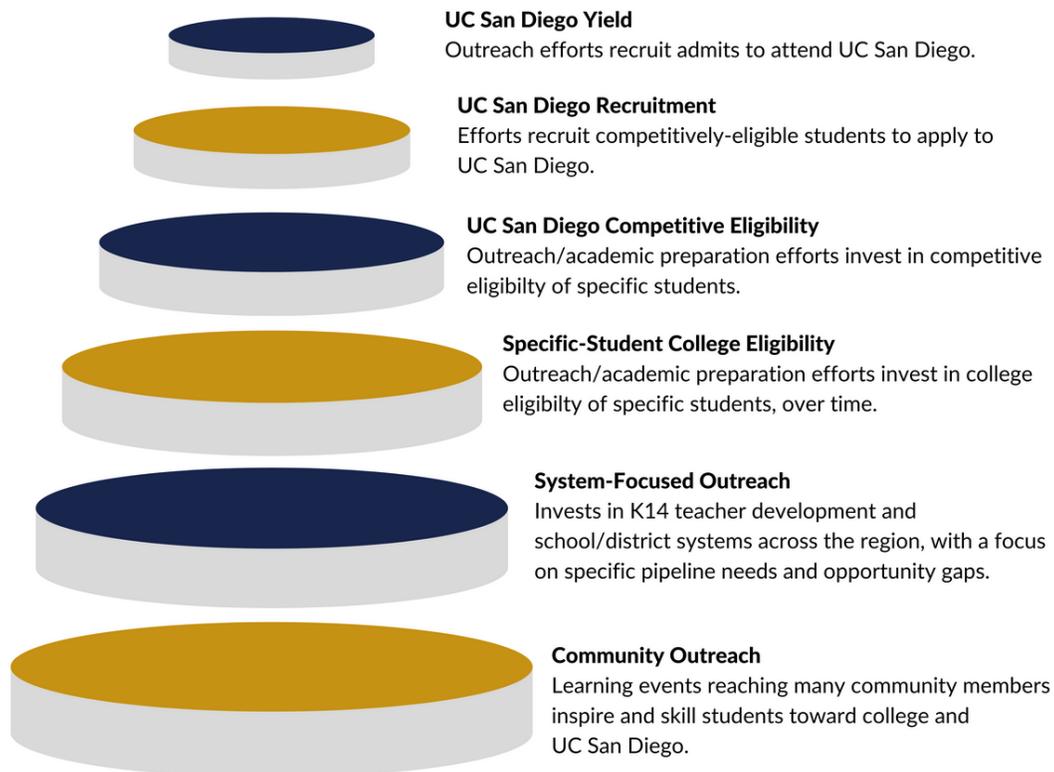
- As academic coordinators and research scientists, CSSI personnel **offer free consultations on program/grant/evaluation design**. **We often write and shape those sections of grant proposals**. In Year 8, we've supported grants to funders like NSF, ONR, Spencer Foundation, Gates Foundation, NIH, U.S. Department of Defense, and the U.S. Department of Education.
- CSSI personnel **offer free supports linking partners** to philanthropy, industry, community non-profits, districts, schools, and county offices of education, community colleges, teacher professional development opportunities, and informal education organizations.
- CSSI staff also **help execute and evaluate programming** when project-specific funding is secured.

Before CSSI, UC San Diego faculty, staff, and student organizations typically tried on their own to design and implement "broader impact" and education plans for grants, and to shape outreach/service efforts that might be welcomed locally. The tremendous campus and community response to the CSSI has shown that campuses need support organizations to help stakeholders design, execute, and evaluate their education programming in limited time with the most benefits to both university and community. In the CSSI, CREATE acts as UC San Diego's broader impact support organization.

For a multiplier effect, we often partner UC San Diego with local educators to strengthen local K-12 instruction and school systems' offerings, bolstering higher education pathways and supporting the one in five UC San Diego undergraduates prepared in local schools. Simultaneously, we're helping people across UC San Diego build toward skills, degrees, research, service, and grants of their own. For example, we might support a UC San Diego professor to leverage his grant on the physics of music to produce compelling physics lessons for students living near the border. We might support an oceanography postdoc to practice communicating her science while helping local teachers enliven middle school math, a key "Achilles heel" of STEM pathways.

Each CSSI effort bolsters UC San Diego priorities for UC San Diego's own students and faculty, while supporting students and educators across the San Diego education community. As Image 1 shows, CSSI projects range from broad outreach linking UC San Diego to the San Diego community to projects supporting local teachers' professional development and preparing local students for the rigor of our own campus and college overall.

Image 1: CSSI Supports all "Levels" of UC San Diego Outreach .

UC San Diego Yield
Outreach efforts recruit admits to attend UC San Diego.

UC San Diego Recruitment
Efforts recruit competitively-eligible students to apply to UC San Diego.

UC San Diego Competitive Eligibility
Outreach/academic preparation efforts invest in competitive eligibilty of specific students.

Specific-Student College Eligibility
Outreach/academic preparation efforts invest in college eligibilty of specific students, over time.

System-Focused Outreach
Invests in K14 teacher development and school/district systems across the region, with a focus on specific pipeline needs and opportunity gaps.

Community Outreach
Learning events reaching many community members inspire and skill students toward college and UC San Diego.

We're designing new ways to leverage a university to create K-20 local opportunities to learn.

CREATE STEM SUCCESS INITIATIVE (CSSI)

UC San Diego

CREATE
Center for Research on Educational
Equity, Assessment & Teaching Excellence

July 2013-June 2021

>18,000

K-20 students and families reached via CSSI outreach events.

250+

teacher professional development efforts supported with immediate impact on hundreds of local precollege students each year and thousands more over time.

149 grants

and contracts supported by CSSI have been awarded to campus and community partners, including STEM education research grants and STEM research grants with education components.

$65.8 Million
brought to UC San Diego with
$15 Million
in indirect costs;
$51.4 Million
in pending grant applications.

1,373 CSSI projects[1]

reflecting work on

297

awarded, pending, and submitted grants & contracts and

1,076

additional service or outreach and education projects.

1. A "project" tallied reflects focused CSSI staff support to others from campus/community, ranging from consultation to design to evaluation to execution.

$43 Million

through collaboration with community education partners;

254+

UC San Diego faculty, staff, postdocs, and student organizations supported to consider, conceptualize and submit outreach/ education and broader impact plans for more competitive grants. See list here.

90 evaluations conducted on projects supporting K-20 students and educators.

82 National Science Foundation (NSF) Supports to UC San Diego Faculty.

Years 1-8: What We've Accomplished

In our first eight years, UC San Diego's CREATE STEM Success Initiative has become a leading-edge model for how a public university can leverage its resources for the public good. Here are our outcomes at a glance.

From July 1, 2013, to May 31, 2021, CSSI staff at CREATE have worked with hundreds of UC San Diego faculty, staff, students, and K-12 community partners on 1,373 CSSI projects[1] reflecting work on 296 awarded, pending and submitted grants/contracts, **and 1,076 additional service or outreach and education projects**.

- **149 CSSI-supported grants and contracts have been awarded to campus and community partners**, including STEM education research grants and STEM research grants with education components.
    - **$65.8M** brought to UC San Diego with **$15M** in indirect costs; **$51.4M** in pending grant applications.
    - **$43M** brought to community education partners.
- CSSI staff at CREATE have supported 254+ UC San Diego faculty and postdocs to conceptualize, design, expand, evaluate, or execute education equity projects, including outreach/education plans and broader impact/evaluation for more competitive grants. See the list here.
- We've offered **82** National Science Foundation (NSF) supports to UC San Diego faculty.
- CSSI researchers have conducted **90 evaluations** on projects supporting K-20 students and educators.
- CSSI personnel have supported **250**+ **teacher professional development efforts** with immediate impact on hundreds of local pre-college students each year and thousands more over time.
- CSSI outreach events have reached **more than 18,000** K-20 students and families.

UC San Diego Entities Supported by CSSI in Year 8 (sample)

- Advancement
- Faculty in all Academic Divisions
- Birch Aquarium at Scripps
- Campus/student organizations (e.g., NSBE, SACNAS, SHPE, OSTEM, Triton Racing, SWIGS, AMSA, Neuro Outreach Program, ECE, CS foreach)
- Early Academic Outreach Program
- Enrollment Management
- Extension
- Institute for Neural Computation
- Intertribal Resource Center
- Jacobs School of Engineering
- OASIS-SSSP
- Office for Equity, Diversity, and Inclusion
- Office of Operational Strategic Initiatives
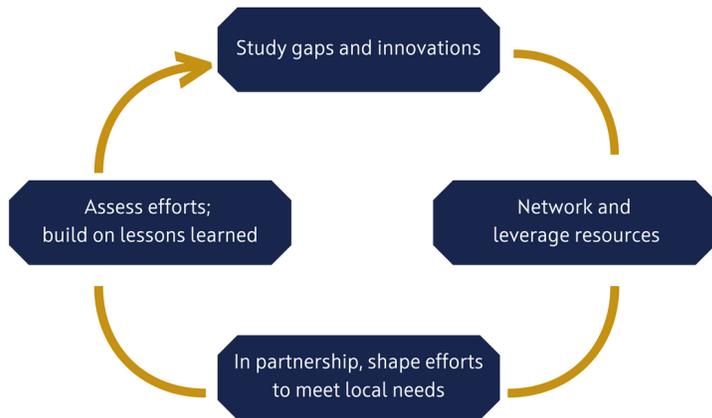- Organized Research Units

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1. A "project" tallied reflects focused CSSI staff support to others from campus/community, ranging from consultation to design to evaluation to execution.

- Qualcomm Institute/Calit2
- Rady School of Business
- San Diego Nanotechnology Infrastructure
- School of Medicine
- Scripps Institution of Oceanography
- Skaggs School of Pharmacy and Pharmaceutical Sciences
- Student Affairs
- Teaching + Learning Commons
- The Chancellor's Office
- The San Diego Supercomputer Center
- TRiO Outreach Programs
- UC San Diego Alumni
- UC San Diego Latinx/Chicanx Academic Excellence Initiative
- UC San Diego Colleges

Community Entities Supported by CSSI in Year 8

- Educators across the region's most diverse school districts; the San Diego County Office of Education
- Local industry (e.g., Qualcomm, NIWC (formerly SPAWAR), City & County of San Diego)
- Local philanthropic agencies (e.g., Price Philanthropies, San Diego Foundation, Yankelovich Center)
- Community organizations (e.g., Groundwork Chollas Creek, EarthLab, San Diego Rotary, regional libraries, Boys and Girls Club, PIQE, BEST, MESA, La Maestra Center for Youth Advancement, United Service Organization (USO) Camp Pendleton)
- National societies and organizations (e.g., the Society for the Advancement of Chicanos and Native Americans in Science; SACNAS, Institute of Electrical and Electronics Engineers; IEEE, Partnership for Progress on the Digital Divide)
- Informal science institutions (e.g., Balboa Park Museums, RH Fleet Science Center, Elementary Institute of Science, FabLab)
- State/national education organizations (e.g., the California Subject Matter Projects and statewide Early Academic Outreach Programs, Code.org, Computer Science Teachers Association).
- In Year 8, we established new partnerships including Citizen Schools, TGR Foundation, Scripps Research Education & Training, and Malcolm X Library.
- Several projects include partners from the UC Office of the President.

CSSI staff are helping partners across campus and community to:

Study gaps and innovations

Network and leverage resources

In partnership, shape efforts to meet local needs

Assess efforts; build on lessons learned

Study K-20 opportunity gaps, pipeline "leaks," and innovations;

Network and leverage UC San Diego's resources to help meet community and campus educational needs;

Collaboratively create and shape UC San Diego STEM education efforts, particularly those supporting underrepresented students (K-20), educators, and community programs;

Assess efforts; build on lessons learned.

Through CSSI, **we're positioning UC San Diego as a national model for local community impact**.

Where are We Working? CREATE/CSSI Efforts Years 1-8
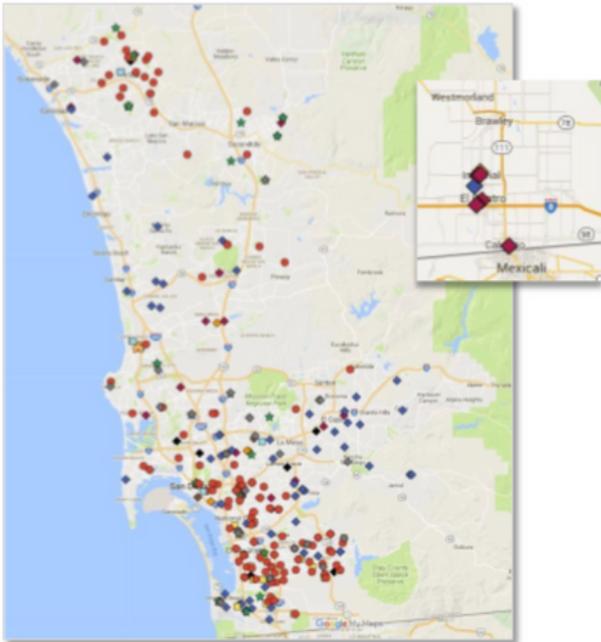
In efforts located across the community as well as on-campus, CSSI staff are encouraging colleagues to include low-income and first-generation college students (and potential transfers) in opportunities that previously have focused largely on high-income students, and to invest particularly in local teachers as well as youth to improve local learning opportunities overall.

This summer, **we're "mapping" recent CSSI expansions of local outreach to support the next strategic outreach planning with partners.**

Highlights of our Year 8 work are detailed in the remainder of this report. These highlights are just a slice of what we've done -- during a global pandemic.

All our best, and for the larger CSSI team,

Mica Pollock

Director, CREATE (Center for Research on Educational Equity, Assessment, and Teaching Excellence)
Professor, Department of Education Studies

(CREATE CSSI team members contributing to this report and the work in it are named throughout. Report produced additionally by Laura Santos. CSSI project support is provided by CREATE staff Yuka Nakanishi, Christina Gonzales, and many more.)

Highlights CSSI Year 8 | CSSI Research & Evaluation/Grant Proposal Work

We share here a partial list of grant proposals supported in Year 8 by two CSSI Research and Evaluation (R & E) leaders, Dr. Monica Sweet and Dr. Joel Brown, as a glimpse of the extent of CSSI projects and consults even during a pandemic year. The CSSI R & E team continued to work on dozens of existing STEM projects in Year 8, while also working regularly with faculty to conceptualize, design, and write evaluation pieces for new larger STEM-focused grant proposals. In addition, R & E team members were often asked to partner with campus and K-20 community members to help design, write, and implement grants solely focused on education and associated research/evaluation. CSSI researchers also wrote their own proposals in order to better understand how STEM-related education programs work, and for whom.

What follows is just a sample of the grant proposal-related work of Drs. Sweet and Brown this year. This helps convey the depth and breadth of what CSSI team members can do for campus grant-seeking, with CSSI support. In turn, funded grants support not only UC San Diego faculty and labs, but also varied K20 STEM education-related efforts in our region.

In Year 8, Dr. Sweet played a significant role in 22 grant proposals: 19 submitted by UC San Diego STEM faculty or STEM-related programs and 3 submitted by outside entities with a UC San Diego/CREATE sub award. This number does not include Dr. Sweet's many basic consults on methodology, design, and/or evaluation, nor all the planning meetings and work Dr. Sweet conducted in Year 7 toward proposals to be submitted in Year 8. New to CREATE/CSSI in Year 8, Dr. Brown focused on supporting several major grants and supporting the campus' ongoing requests for support on grant/evaluation design.

A sample of efforts just from January 2021-June 2021:

Examples of substantive grant involvement, including executing evaluations/research when funded

- BII: Institute for Integrative Multiscale Multicellular Dynamics. NSF BII proposal. **PI**: **Padmini Rangamani**, **UC San Diego**, **Mechanical and Aerospace Engineering**. Sweet developed and wrote the evaluation plan/budget and co-developed the education/outreach plans.

- CS-BAITEs (Bytes of AI-Themed Education for Elementary Schools). NSF CSforALL proposal. **PI**: **Amy Eguchi**, **UC San Diego Education Studies (Co-PIs Judy Fan and Christina Gardner-McCune, UC San Diego)**. Sweet advised on program design, methods, and evaluation plans.

- Discovery of Functional Materials for Energy Harvesting and Information Processing. NSF PREM proposal. **PI**: **Boris Kiefer**, **University of New Mexico**, **Physics**; **UC San Diego sub-award PI**: **Michael Sailor**, **Chemistry and Biochemistry**. Sweet co-designed the logic model and related evaluation plan, and provided campus retention and completion data for the proposal.

- Curriculum and Professional Development for a Two-Year High School Integrated Discrete Math and Computer Science Sequence. DoD NDEP proposal. **PI**: **Ovie Soto**, **UC San Diego CREATE**, **Co-PI Robert Sinkovits**, **UC San Diego**, **San Diego Supercomputer Center**. Sweet consulted on the overall program design, designed the associated evaluation plan, and wrote the evaluation section and Logic Model.

- **EAOP PCS Evaluation**: Sweet is leading an evaluation of the President's Pre-College Scholars Program, funded partially by UC San Diego's **Office of Equity**, **Diversity**, **and Inclusion** and partly by UCOP's Outreach and Educational Partnerships. At UCOP's and EDI's request, Sweet is now surveying existing PCS students at all 9 UC undergraduate campuses to learn more about how they think about, plan for, and make decisions about college, how COVID-19 impacted their plans, and what they know and think about their local UC campus as well as the larger UC system.

- **Sloan grant (Monica Sweet, PI; Prof. Pamela Cosman, Engineering, Co-PI)**: The Relationships Between Implicit Bias, Inequity in Graduate School Experiences, and Program Persistence for URM and Female Doctoral Students in STEM. This grant funds two studies to learn more about how STEM graduate students think about diversity, equity, and their graduate student experiences and if/how students experience inequities in their programs. See here.

- **NSF ITEST (Ying Wu, Institute for Neural Computation, PI; Robert Twomey, University of Nebraska, Lincoln and Monica Sweet, Co-PIs)**: An Embodied Augmented Reality Coding Platform for Pair Programming. This project is currently in the design phase of testing an embodied coding platform against a traditional 2D coding system for increasing high school students' engagement and learning of computer science. Sweet and her co-PIs just finished a preliminary study of CS teacher content and pedagogy-based needs and beliefs about student learning and engagement needs.

- **Birch Aquarium's Beach Science Program**: Sweet conducts an annual evaluation of this program; she is currently working to assess new online programming developed under COVID-19.

- **DoDEA MCASP** (Chula Vista Elementary School District/Michael Bruder, CSSI Liaison, Program Director: STEAMing into Health Sciences. This program involves engaging elementary school students with health sciences and related careers through an innovative hands-on Maker-space-inspired experience for students as well as in-class and extra-curricular experiences. Sweet helped this successful grant application awarded in September, and will conduct an independent evaluation of this work.

- **DSSD NSF REU Evaluation** (Designing for Safety and Safety by Design, **Ken Loh**, **Structural Engineering**, **PI**; Sweet is the independent evaluator of this REU.

- **NSF GEOPaths** (**Jane Teranes**, **SIO**, **PI**; Sweet is independent evaluator): GP-GO: The Scripps Institution of Oceanography Geosciences Education and Opportunities (Scripps-GEO) Program. A three-year project aiming to increase the number and diversity of undergraduate students majoring in the geosciences and subsequently pursuing further education and careers in this area, through early exposure to geosciences careers, early opportunities to participate in authentic career-relevant internships, and strong mentoring relationships between students, faculty, and employers.

- **Materials Research in Science Education Center**(MRSEC): Joel Brown supported **PI Professor Michael Sailor** and colleagues from the Departments of Chemistry and Biochemistry, NanoEngineering, Materials Science, and Physics on the Education components of their proposal for a $18 million successfully funded NSF project. Proposed Summer Schools and REU will prioritize engagement of transfer students from community colleges and members of underrepresented minority groups. Personnel exchanges with industry, national laboratories, and international partners will forge robust materials research connections locally, nationally, and globally.

- **UC San Diego Institute for Maximizing Student Development** (**IMSD**), **UC San Diego School of Medicine**: (National Institutes of General Medical Sciences (NIGMS) evaluation), **PI Dr. Antonio De Maio**. Brown supported program evaluation with students graduating from/currently in the IMSD program. See here.

In Year 8, our CSSI research and evaluation team also supported initial consultations, letters of support, or initial outreach/education plan or evaluation planning on projects for faculty across campus and at the UC San Diego School of Medicine and Scripps Institution of Oceanography. The CSSI team also supported many UC San Diego PIs submitting CAREER proposals in Year 8, helping faculty to design education, outreach, and evaluation plans. **We consulted in 2020 with 14 faculty/PIs seeking CAREER grants**; 13 submitted CAREER proposals and 7 were funded. That 7 represents more than a third of all CAREERS funded for UC San Diego PIs in 2020.

As additional examples of CSSI team supports to faculty, Sweet supported faculty **Oscar Mena and Truong Nguyen**, **UC San Diego Jacobs School of Engineering**, to think about next steps in their collaboration with Imperial Valley Community College, and consulted with Logan Heights LLC and their Future Achievers Preschool administration as they thought about expanding and developing a STEAM preschool curriculum. Sweet also supported colleagues at **Scripps Research** on the development, implementation, and evaluation of a new pilot program to bring SR scientists productively into elementary and K-8 classrooms **(SMILE: Scientists Making Impacts in Learning Environments)**; Sweet designed an evaluation for the pilot program (surveys, observations, interviews), to provide solid formative feedback to the SR Education and Outreach team as they plan for the next iteration of SMILE, **resulting in over 300 students served** in Chula Vista Elementary School District as one start. Finally, Sweet planned an evaluation for E_CSPD_Wk: Expanded Computer Science Professional Development Week, a **Computer Science Teachers Association** grant awarded by the Department of Education. This 5-year grant will train and follow CS teachers from training through student impact.

Brown also offered consultation on research/evaluation to grant-seeking and successfully funded faculty from departments of **Biochemistry**, **Electrical and Computer Engineering**, **Mechanical Engineering**, **Chemistry**, **Physics**, **Bioengineering**, **Sociology**, and **Mathematics**.
See our updated List of Supports to Faculty for more.
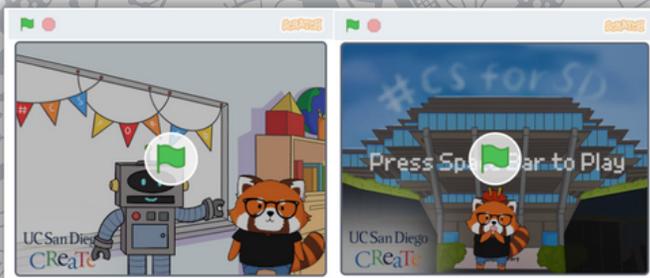-----------------------------------
We now share examples of the many local opportunities to learn generated in Year 8 of the CSSI.

***A note to readers: as Engineering stretches across all subject areas, CSSI Engineering-related projects are found throughout this Year 8 report instead of listed in a separate section.

CREATE STEM Success Initiative:

Leveraging a University to Create Local Opportunities to Learn
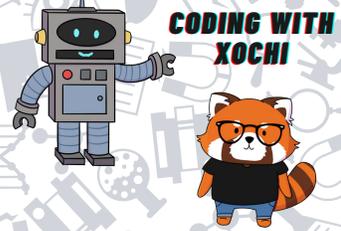
Highlights Year 8

Highlights CSSI Year 8 | Mathematics Opportunity

The CSSI has focused on mathematics opportunity as a key need in our region, often calling it the "forgotten M of STEM." We target mathematics as a gateway into the sciences and as a key reason many students struggle to achieve college admission eligibility overall -- and eventual success in STEM majors particularly. We view teachers as force multipliers. Therefore, the CSSI invests heavily in teachers and teacher-leader development as a direct conduit to elevate student achievement in STEM.

The three-year-old **UC San Diego Mathematics Project** (UC San Diego MP) in CREATE leads the CSSI work in mathematics education. Led by **Dr. Osvaldo "Ovie" Soto and Joan Commons**, the UC San Diego MP took the helm after several years of National Science Foundation (NSF) and Gates Foundation-funded CSSI regional networking in mathematics. The UC San Diego MP is part of a statewide network of 19 California Mathematics Projects, focused on the development of teacher leaders in the San Diego region. Advisors include top mathematics educators and administrators from **San Diego K-12 districts**, **the SD County Office of Education**, **and UC San Diego's Mathematics Department and Education Studies Department**.

Through the CSSI, the UC San Diego Mathematics Project has further strengthened UC San Diego's reputation as a leader in K-12 mathematics support for area districts, schools, and teachers while supporting UC San Diego faculty to connect to local education stakeholders.

This year, Drs. Soto and Yonezawa of UC San Diego partnered with **Drs. Daisy Sharrock**, **High Tech High Graduate School of Education**; **Harold Asturias**, **Director**, **CEMEE**, **UC Berkeley**; **and Kyndall Brown**, **Director**, **CA Mathematics Project** (housed at UCLA) on a successfully won $11 million, five-year **Bill and Melinda Gates Foundation**-funded grant entitled "CARE Network, a Network for School Improvement (NSI)". The CARE Network focused this year on supporting 17 schools in inquiry cycles and PD convenings focused on improving responsive remote mathematics instruction, with the aim "to increase the number of students who are Black, Latinx, Indigenous or from low-income backgrounds who have a strong academic identity and are on-track in 8th grade to graduate high school and successfully enter college and career." bit.ly/2G77RdR ; see also hthgse.edu/research-center/care/.

In 2019, the UC San Diego MP helped **Oceanside Unified School District** win a five-year, $1 million DoDEA grant entitled Project MaSTerS in Math (Marching Students Toward Success in Math). Project MaSTerS focuses on the mathematical achievement of military-connected students. UC San Diego MP is collaborating with **UC San Diego Math Professor Guershon Harel** in professional development (PD) for Oceanside High School math teachers, including a year-round PD, Summer Institutes for teachers, and Summer Academies for students in Summer 2021. The teacher PD and Summer Academies focus on the development of, and transition between, quantitative and algebraic reasoning crucial to entering STEM fields. Between July 2020 and June 2021, these efforts have directly impacted **20 teachers and 60 students** at Summer Academies, and indirectly impacted **over 2,000 students** throughout the school year from Oceanside Unified through investing in teachers who serve many youth.

The Summer Academy represents both a student-facing activity and a form of teacher professional development. During Summer Academies, students receive approximately 30 hours of mathematics instruction and teachers meet daily for two hours to prepare and debrief lessons together with UC San Diego MP staff. UC San Diego MP also deepened nearly 20 San Diego area teachers' content and pedagogical understanding of fractions and proportional reasoning for students in grades 3-9 -- a known Achilles Heel of the math pipeline.

Through CSSI collaboration, UC San Diego MP Director Soto and **Dr. Robert** "**Bob**" **Sinkovits**, **director of the San Diego Supercomputer Center's** scientific computing applications and education and training program, submitted a $6,000,000 NDEP grant to scale up work on their previous one-year, $265K Department of Defense STEM Education Consortium Innovation Bloc Grant on "Introducing Computing And Technology through Problem-Solving in Discrete Math (ICAT)". The team is now designing a Summer Academy (July 2021) for 20 San Diego area underrepresented and military-connected high school rising seniors. The virtual training will introduce students to the python computer language as an important tool for solving math problems.

Soto also spent Year 8 advising **San Diego Unified** colleagues who wish to adopt a discrete mathematics course he created, through a prior CA Dept. of Education award, to broaden mathematics pathways in high school. He also worked with **Sweetwater** colleagues to sustain their current discrete mathematics course. The UC San Diego MP and Soto are also working on a CA state Gear Up grant supporting math teachers at Lincoln, Morse, and Kearny cluster schools.

Finally, during the COVID-19 pandemic, as part of a larger DSEC grant expanding STEM opportunities, Dr. Soto and Genevieve Esmende (DoD STEM Ambassador) launched a partnership with MATHCOUNTS aimed at creating Math Clubs in San Diego area middle schools. 30 teachers from underserved districts attended a 3-day informational series on the virtually adapted aspects of MATHCOUNTS' Math Club: games, exploration, and problem sets. To celebrate the establishment of four new MATHCOUNTS Math Clubs in San Diego, 30 students engaged in a MathCounts Escape Room where they worked collaboratively to solve problem sets.

All of these programs create a stronger mathematics pipeline in our region, tighter connections between our UC San Diego campus and key mathematics educators (including faculty collaborators on grant proposals), and supports for underrepresented students to remain on-track for college admissions.

Highlights CSSI Year 8 | Science Opportunity

CSSI staff support many UC San Diego scientists to leverage their work for the San Diego region. In Year 8, CSSI supported **Dr. Victor Minces**, **Assistant Research Scientist from Cognitive Science**, in a newly won NSF grant for $1,499,644 — DTI: Increasing Students' Interest in STEM through the Science of Music. Tapping widespread interest in music among adolescents, this project seeks to help youth explore the connections between music and science and in particular, the relationship between sound and the physics of waves. Through Minces' online and hands-on programming Listening to Waves (LTW), Minces' team has been working within middle schools serving low-income and underrepresented students, guiding students to explore and playfully create sounds and actively experience the physics of music. The program has demonstrated statistically significant increases in students' engagement with science, science class, self-efficacy, and interest in pursuing careers in science. **Susan Yonezawa**, **CSSI/CREATE**, is co-PI and will support the project's expansion in the **Sweetwater Union High School District**, **San Diego Unified School District**, and **Compton Unified School District**, and in partnership with the many districts connected to the **San Diego County Office of Education**, including many in rural areas. LTW will be providing in-depth professional development to 80 teachers; the California Reading and Literature Project in CREATE will advise on accessibility for English Learners. **With each teacher assigned over 100 students**, **the program will be directly reaching more than 8000 students per year**.

The **San Diego Science Project (SDSP)**, a key CSSI partner organization inside CREATE led by CSSI staff **Kathryn Schulz**, helps UC San Diego faculty and students establish strong relationships with K-12 science teachers in the San Diego region, benefitting campus, and local education simultaneously.

In Year 8, SDSP/Schulz supported **Dr. Itay Budin**, **Department of Chemistry**, in a successful NSF CAREER grant on "Structure, Function, and Evolution of Membrane Domains in Living Cells." An interdisciplinary group of high school science teachers from schools serving low-income students in the **Sweetwater Union High School District** will develop lessons translating Budin's research and methods into the high school classroom. SDSP/Schulz also supported a successful NSF CAREER grant by **Dr. Michael Yip**, **Department of Electrical and Computer Engineering**, "Contextually Autonomous Robotics Surgery". Dr. Yip's research focuses on the development of surgical robotics that will assist medical professionals when outside the hospital setting, ie, EMTs in the field. SDSP collaborated with **Art Lopez**, **Sweetwater**, to assist Dr. Yip in developing a program for URM high school students that would engage them in the fields of biology and computer science as career pathways.

In a continuing broader impact partnership with **Professor Michael Gilson**, **co-director of the Skaggs School of Pharmacy and Pharmaceutical Sciences** Chair in Computer-Aided Drug Design, Schulz/SDSP supported a follow-up NIH Grant, "BindingDB: An Open Knowledgebase of Protein-Small Molecule Interactions", to engage high school teachers from various San Diego County school districts in lesson study adapting cutting edge science to local classrooms. A hybrid online/in-person lesson study will support teachers in practicing new lessons with their underrepresented students.

Gilson's research includes all strands of science — including software engineering, requiring SDSP to design a multidisciplinary approach in lesson study development that can convey to students how learning and understanding biology and chemistry might possibly lead to a career in computer science.

In Year 8, even in a pandemic, SDSP met virtually weekly with **SDCOE** and 30 K-12 teachers from San Diego, Orange, and Imperial Counties, in the NGSS Science Assessment Network, an effort to develop science assessments supporting equitable student learning. SDSP also supported **Scripps Research** colleagues in designing exciting lessons on chemical reactions, now being tested in elementary schools in **Chula Vista Elementary School District** and the **Lemon Grove School District**.

SDSP also provided professional development support for remote science teaching to **nearly 50 teachers** from **San Diego Unified**, **San Marcos Unified**, **Chula Vista Elementary School District**, **Vista Unified School District**, and **Grossmont Union High School District**. Schulz also consulted to numerous professors seeking grants and education plan/broader impact supports, including faculty from departments like **Electrical and Computer Engineering, Chemistry and Biochemistry**, **Ecology**, **and Scripps Institution of Oceanography**.

Highlights CSSI Year 8 | Computer Science Opportunity

In the past several years, CSSI work on expanding computer science opportunity has increased exponentially, with a focus on systemic opportunity creation across district systems. (See Mai, M. & Simon, E. (2020). "Commentary: Why prioritizing computer science education is critical to California's future," In The San Diego Union Tribune.) CSSI leader **Dr. Susan Yonezawa** supported the **San Diego Unified School District** in implementing CodingOurFuture, a $4M US Department of Education grant known as an Education Innovation and Research (EIR) four-year award. Via a service agreement, CREATE with colleagues from **Education Studies** (**Dr. Beth Simon**) is helping to provide multiple 6-week, open-source, 3rd-5th grade Computer Science curriculum units as well as supportive PD for 6th-8th grade Computer Science teachers within the district. Supports include advising and training teachers. But they also include the integration of CS in both middle school mathematics and English Language Development (ELD) classes in collaboration with CREATE's **California Reading and Literature Project**. **This work will eventually serve all elementary and middle schools in SDUSD**. During the 2020-21 pandemic school year, the 3rd-grade units were piloted at **20 elementary schools**, and 17 schools actively participated in the training. Link to sample curriculum. In the summer of 2021, the team is planning to train 140 3rd grade teachers, and approximately 20 4th grade teachers, as well as 10 middle school CS teachers in August.

CSSI leader Dr. Susan Yonezawa (PI) and her co-PI **Dr. Beth Simon** (**EDS**), **with CSSI CS leader Minh Mai and EDS doctoral student Kirk Rogers**, worked through the pandemic to execute a $1m NSF CISE grant called CS-LISTEN: Computer Science Learning and Inquiring with Students Through Equity Networks, a Research-Practice Partnership. CS-LISTEN worked all year to tap student voice to broaden engagement by low-income, African American, Latinx students and young women in computer science pathways in schools and districts, in partnership with K12 educators and university leaders. **24 teams of high school students were tapped and trained as student co-researchers** (SCRs) from four large districts (**Escondido**, **San Diego**, **Sweetwater**, **and Vista**).

This year, in a pandemic no less, **200 students and 12 CS-lead teachers from 9 high schools researched CS access and opportunity in their schools and then enacted recommendations** in virtual projects including coding boot camps, hackathons, promotional materials, presentations to district and school administrators, and more. (**For pictures and project accomplishments from one participating school**, **Mission Vista High School**, **see here**! **CS Listen Accomplishments**)

In an inaugural CS LISTEN UP Conference hosted by CREATE, over 240 attendees learned about the research and equity designs of each high school team (see here and here.) Twelve CS LISTEN Student Co-Researchers also presented to UC San Diego AI faculty this winter. Teachers and administrators interviewed reveal that CS-LISTEN students have helped to expose broadening participation in CS (BPC) issues in novel ways, with substantial gains in underrepresented students' CS course enrollment.

See 2019-2020 project video here.

Through CSSI efforts, CREATE also is now the San Diego regional organization for **Code.org**, a national nonprofit dedicated to expanding access to computer science in schools and increasing participation by women and underrepresented youth. Directed by CSSI team member **Minhtuyen Le Mai**, Code.org in Year 8 hosted two CS Fundamentals Workshops supporting educators from the **Vista Unified School District** in using Code.org's platform to teach CS to elementary school students and teachers. In a pandemic, Code.org offered well-attended follow-up workshops for Code.org Discoveries and Principles. See this recruitment video for CS teachers!

CSSI computer science leader Minh Mai and **CSSI outreach leader Beto Vasquez** just successfully won a $292,000 grant from the San Diego Foundation Level Up program for **CREATE OFFERS** (**Opportunities for Future Engineers**, **Researchers**, **and Scientists**). This week-long STEM Camp will be offered **free of charge to 112 3rd-5th graders in Southeast San Diego**, four times in July. Partners include the **Southeast San Diego STEM Ecosystem**, **Fleet Science Center**, **Malcolm X Library**, **Science Delivered**, **and the Birch Aquarium and the Fleet Science Center**. Also as part of CREATE OFFERS, **60 San Diego Unified 9-12th students will experience a free 3-week virtual camp** to learn about machine learning and data modeling using real datasets through Code.org's AI unit, then meet advisors to review their college applications.

Community outreach is also key for connecting students and families to UC San Diego. In Year 8, CSSI and Code.org leaders inside CREATE (Minh Mai, **Laura Santos**, **Dana Chung**, with Beto Vasquez) worked with **CS foreach**, a community outreach, UC San Diego student organization that "aims to address the problems of equity and access in regards to Computer Science education by taking an active role to support and initiate efforts to teach Computer Science education and cultivate mentorship between college and K-12 students in the underserved communities of San Diego." The CSSI/CS for each team co-sponsored **TritonHacks 2021**, a high school-centric hackathon aiming to provide students of all backgrounds and experiences - especially novices and students in underserved communities - two days of STEAM exploration and collaboration. **Held virtually from June 26th-27th**, **TritonHacks engaged more than 90 students**.

Further fueling our CSSI work in computer science opportunity, the **Computer Science Teachers Association in San Diego** (CSTA-SD), a network of K-14 CS educators, is now hosted at CREATE and just celebrated its second year. Even in a pandemic, this robust teacher-led organization hosted well-attended professional learning meetings, with partners from **UC San Diego**'s **Pathways2AI and CodingOceans at SIO**; **CS foreach**; **Vidcode**; **Scratch**; **Encore**; **Technolochicas at NCWIT and CodingOurFuture**.

With the success of CSTA-SD, the **national organization of the Computer Science Teachers Association** (**CSTA**) asked to partner with CREATE/CSSI leaders, and then the team collectively won a $4 million federal Department of Education proposal to support CS high school teachers to teach CS successfully to English Learners. The CSSI team and **PI Susan Yonezawa** networked faculty in **UC San Diego Education Studies** (**Dr. Beth Simon**, **Dr. Megan Hopkins**), **Economics** (**Dr. Julian Betts/SANDERA**), **and the campus's California Reading and Literature Project** (**Deborah Costa-Hernandez**, **based at CREATE**) to support the now awarded Computer Science for English Learners (CSforEL): Increasing Participation and Achievement in Advanced Placement Computer Science Principles (AP CSP) for English Learners. Half of the overall award supports UC San Diego efforts. The four-year, federal grant designs high-quality teacher professional development (PD) and administrator/counselor PD to improve the pipeline of current and former English Learners in AP CSP. Given the significant numbers of English Learners in our region, and the appallingly low rate at which EL students enroll in high school CS courses (even in majority Latinx schools), CSSI leaders see this project as essential for diversifying the pipeline to UC San Diego STEM majors over time. A randomized control trial for this project is currently underway led by a joint mixed-methods evaluation team including Professor Julian Betts, (Economics, SanDERA) and CREATE.
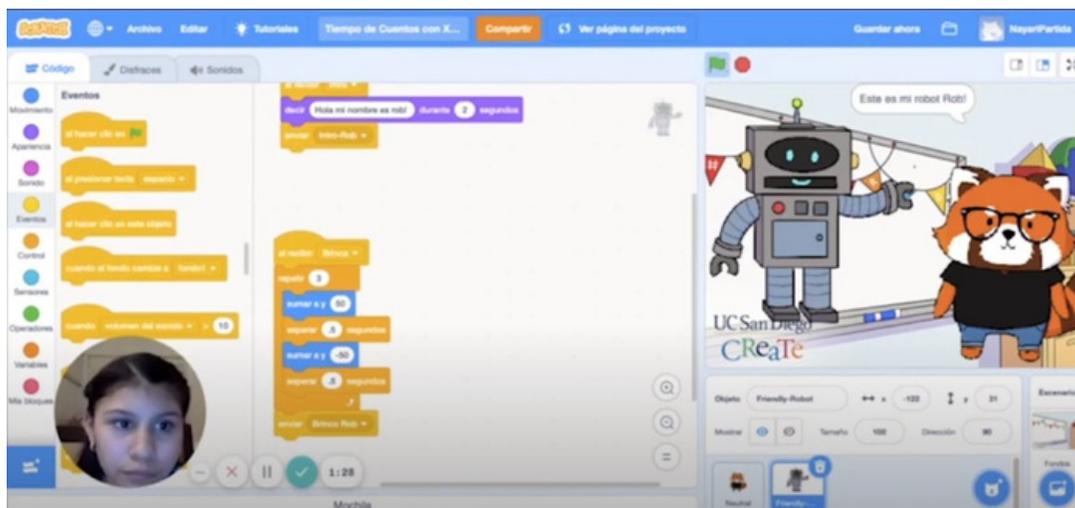
Highlights CSSI Year 8| STEM Community Outreach

During distance learning in this pandemic Year 8, CSSI STEM Community Outreach effort focused on providing virtual science engagement to K-12 students, working to address both needs and inequities. **CSSI STEM Community Outreach Director Beto Vasquez and his CREATE STEM Outreach Ambassadors** quickly understood that they could not continue to conduct "business as usual": access to technology (computer-to-student ratios at home), bandwidth, and tech literacy were huge obstacles; everyone had to assume new roles, family members and teachers alike. If we wanted to provide live virtual interactions, we needed to be thoughtful of screentime (as students were online for school) and internet capabilities (because many homes had more than one person working online), while working to provide a robust (yet remote) experience. Since the pandemic had shut down all of our in-person outreach projects/programs, we knew we had to figure out a way to help.

Our team first worked with community groups like the **Southeast San Diego STEM Ecosystem** to listen to students/families, community partners, and educators to better understand specific challenges. As a result, we developed a series of pre-recorded STEM lessons, interactive panels/ sessions/workshops, and synchronous sessions with pre assembled kits provided to participants in advance. Through this innovation, we found ways to match and even surpass our traditional in-person events. Our team also has training in virtual platforms such as Zoom/Google Meets and Hopin, and new facility with videography/editing and other online tools that will remain useful for programming. We also have lots of new content, lessons and handouts to maximize our post-pandemic reach.

Collectively, with all these barriers and efforts, we were still able to make close to **6000 contacts with the general public** via synchronous and synchronous activities.

Through our STEM 10+ Series, we have created **over 70 STEM videos** that have been watched over 1000 times and counting. Since April 2020, our weekly (pre-recorded) 10-15 minute STEM demos/lessons have provided families and their children the opportunity to discover science with household items from the comfort of their home! STEM10+ was designed to give folks a chance to watch the videos at their convenience and in one quick seating (due to short time). These weekly, bilingual videos are also accompanied by a handout (in Spanish and English) for viewers to follow along, an ideal resource for educators looking for online resources to complement their virtual classroom instruction.
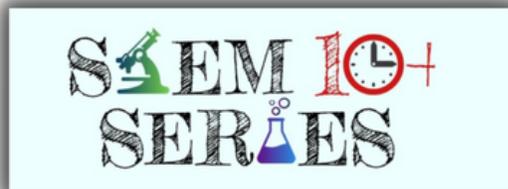
These videos are designed to create access and inclusivity to everyone as best as possible while simultaneously touching on Next Generation Science Standards (NGSS) and relatability. For example, our Volcanoes lesson provides examples on how to create different types of volcanoes with a variety of materials found around the home!

More broadly in Year 8, from June 2021 to May 2021, CSSI STEM Outreach under Vasquez' leadership hosted and supported **48 programs**, **initiatives**, and **events** (webinars/conferences) supporting the professional, academic, and personal development of K-20 and general community groups. Our efforts **reached more than 3,800 K-20 students**, **families**, and **community members**. In many cases, **we employed 2**- **and 4-year students from underrepresented backgrounds to lead our efforts**. Year 8 examples included:

- **STEM 10+ Series**
  - This series consists of easy-to-replicate (low-cost) experiments that come with a culturally relevant pedagogical approach and are provided in Spanish & English. (see above).
- **Future Faces of STEM Conference**
  - In Year 8, this annual conference made its virtual debut. CREATE and regional partners created a virtual space for **211 participating high school students**, **community college students**, **and the regional STEM community** to participate in workshops/panels/webinars of professionals and students, exploring experiences and resources in academia and the workforce.
- **Womxn in STEM series**
  - This series was a collaboration between the **SUBIR Dreamer Resource centers at San Diego City College**, **SACNAS**, and **CREATE** and was designed to develop a space for students to engage in dialogue with women scientists. Women scientists, most from underrepresented backgrounds, shared their experiences/challenges in 5their academic and professional journeys. **140 people attended via Zoom**.
- **Comienza con un Sueño**
  - This annual conference for first-generation college-going students was conducted virtually (via Hopin) on a platform allowing participants to engage with each other in various settings and learn about the higher education journey. Our team supported program coordination and content production. This event focused on providing engaging and inclusive programming for **400 attending 6**-**12 students and their families from local school districts**, providing speakers, sessions (for parents and students), and resources.

- **Sherman Heights Community Center STEM Program**
    - We partnered up with the **Sherman Heights Community Center** to develop virtual STEM programming for 25 students from 3rd-8th grade in an eight session course. Students engaged in STEM through culturally-relevant STEM lessons, by keeping science journals, and following along with bi-weekly STEM lessons guided by our team, while learning from a diverse panel of post-doctoral researchers. Done via Zoom.
- **Scholarship & Research Preparation Event**
    - In collaboration with **SUBIR Dreamer Resource Center and San Diego City College-SACNAS**, we created this program to help community college students become strong candidates and applicants for scholarship and internship opportunities. This three-part series included How to compose a Personal Statement, Scholarship & Internship Application Tips & Tricks, and a Virtual Resource Fair (to help students connect with scholarship and internship program resources). This was all done via Zoom.
- **San Diego STEM Alumni**
    - In an effort to increase interest in STEM (specifically among underrepresented groups), CREATE (with the support of the Department of Defense) launched the **San Diego STEM Alumni Project**. This project highlights the narratives of alumni from local (Imperial Valley, central and south San Diego) San Diego county high schools to share with and inspire current students in those respective schools or districts.
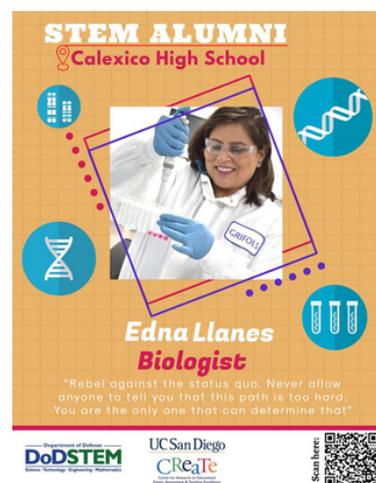
Community College Support

Additionally, in an effort to support community college students' preparation and access to resources for STEM-related studies, CSSI staff have consulted on several large federal grants supporting UC San Diego to leverage resources to bolster 2- and 4-year interactions. Also in Year 8, we piloted a summer research experience (REU) specifically for local community college students. The **STEMULATE REU program**, **funded by the San Diego Foundation**, provided paid research internships for 14 community college students from **nine community colleges throughout San Diego County**. This group of intergenerational students represented a variety of backgrounds, experiences and majors and were predominantly placed in UC San Diego research labs for an intensive six week summer research experience after completing a community service requirement in the spring.

Finally, in the spirit of CREATE's commitment to equity, CSSI STEM Outreach provided REU application support in Fall 2020 for multiple UC San Diego REUs, ensuring equitable access to scholarship and internship opportunities for potential and diverse groups of visiting community college scholars.

In a difficult year, we never paused in our efforts to support and create equitable opportunities for underserved and underrepresented communities--our motivational force.

Highlights CSSI Year 8 | Special Projects

Department of Defense (DoD) Defense STEM Education Consortium (DSEC)

Another intensive project engaging CREATE/CSSI since 2019 is the Department of Defense's (DoD) five-year **Defense STEM Education Consortium** (**DSEC**). As one of three DESC hubs across the nation, CREATE is excited to continue our work with DSEC partners and advance the mission to provide equitable opportunities for underrepresented and military-connected groups in the region. CREATE's CSSI DSEC charge is to strengthen and expand the reach of all DoD STEM outreach programs in the San Diego region. The $75 million national effort, which is headed by RTI International in North Carolina, focuses on STEM enrichment programs for students and educators, STEM workforce engagement, program evaluation, and public outreach. As **leads of San Diego's DSEC hub**, **CSSI staff at CREATE** continue to provide organization, coordination, and communication across new and existing DoD-supported STEM outreach programming, connecting regional and UC San Diego-specific resources, faculty, staff, and student groups to DoD-supported STEM outreach programs. In Year 8, CSSI DSEC efforts included:

- **Advancing efforts to co-develop regional data maps providing visual representations of STEM deserts in San Diego County**. Based on mapping results, the UC San Diego CREATE DSEC hub identified and is building efforts to increase STEM support in **San Diego Unified School District's** (**SDUSD**) **Southeast San Diego area schools** (specifically Morse and Hoover clusters), and schools in the **Sweetwater Union High School District** (**SUHSD**). These areas serve predominantly Black, Latinx, and military-connected students.

- **Leading regional efforts that support building an extensive network of local STEM-supporting organizations**, **such as museums & non-profits**, **industry partners**, **local government**, **the San Diego Workforce Partnership**, **federal resources**, **and DoD partners**. Goal: to create a holistic approach leveraging STEM learning to create economic, generational, and community opportunities for upward mobility.

- **Building relationships with local educators and schools that serve priority student groups and military-connected families**. CSSI team member Beto Vasquez serves as Chair for the Southeast **San Diego STEM Ecosystem**, to focus on targeted outreach efforts in historically underserved communities in Southeast San Diego, City Heights, South San Diego and North County.

- **Sponsoring and supporting introductory computer science workshops to students underrepresented in CS**. CREATE hub leadership and CSSI Computer Science staff provide logistical support for **NCWIT Aspire IT** programs, including virtual adaptation, technology support, and marketing to students/teachers. In Summer 2020, CREATE staff Minhtuyen Mai, Laura Santos and Dana Chung supported two 2-week sessions of Girls in Computer Science & Technology (GCT) coding camp, family engagement sessions, and career panels with **NIWC-Pacific**, for underrepresented low-income students.

The CREATE CSSI team's efforts have been so successful that the RTI lead organization and the DoD have encouraged additional grants and award nominations from the CSSI team. Via our nomination, the **Miramar College Biotechnology program** was recently recognized as an awardee of DoDSTEM funding, resulting in **substantially more course sections to local two-year college students in Summer 2021**. Our team continues to spearhead new efforts that have caught the attention of our national partners.

Highlights CSSI Year 8 | Special Projects

UC San Diego Climate Champions

Understanding and Protecting the Planet is a university-wide theme of UC San Diego's strategic plan. With support from CSSI leadership and funding from UC San Diego's Social Sciences Division, and under the leadership of **Nan Renner**, **Ph.D.**, **Senior Director of Learning Design and Innovation**, **Birch Aquarium at Scripps**, and CSSI team member, CREATE/CSSI moved forward to grow and scale programming to advance climate education in San Diego County K-12 schools and climate-related science across the world.

Climate Champions is a collaborative effort among UC San Diego and community partners to address the critical need for K-12 (kindergarten through high school) climate change teaching and learning in schools. Solving the climate crisis requires creating climate champions of all ages — people who are educated on climate science, passionate about addressing the climate crisis, and engaged in concrete efforts to "bend the curve" of global warming via all sectors of our society. In Year 8, Climate Champions laid the groundwork to increase K-12 climate literacy, impact public discourse on climate crisis issues, and catalyze community engagement and climate action. Climate Champions is a collaboration supported by the **Division of Social Sciences** (**UC San Diego Social Sciences Climate Action Lab**) and linking efforts by **CREATE**, **Birch Aquarium at Scripps**, **the Scripps Institution of Oceanography Director of Educational Alliances** (**Cheryl Peach**), **UC Bending the Curve**, **the UC San Diego Community Station EarthLab**, **and the San Diego County Office of Education**. Importantly, Climate Champions also strengthens relationships between the UC San Diego campus and the region's K12 teachers, potentially inspiring thousands of K12 students toward our campus.

In partnership with CREATE and Birch Aquarium staff, and with CREATE-housed California Subject Matter Project directors, including the **California Reading and Literature Project**, **San Diego Area Writing Project**, San Diego Science Project and UC San Diego Mathematics Project, ten "Climate Champion" teacher leaders from throughout San Diego County collaborated to curate, adapt, create, and test K-12 climate curriculum with a board of youth leaders, launching new curriculum and a professional learning community of climate educators.

Teacher Leader teams developed and curated secondary science curriculum with a local focus on a global challenge: to understand climate science and engage with solutions. Resultant units explore impacts of land warming (increases in wildfire), ocean warming (sea-level rise, extreme weather events, ecosystem impacts), and bending the curve of greenhouse gas emissions (through natural climate solutions). The units center student learning, include strategies for English learners, and align with the deep science inquiry required by current standards, while remaining adaptable for other disciplines. **Climate Champions Youth Leaders** curated learning resources for Humanities, History, and Social Science classes, organized around climate justice, activism, policy, psychology, historical roots, and Indigenous knowledge.

Renner and the team hosted the first Climate Champions Virtual Summit on May 22, 2021. **160 educators from K-12**, **university**, **and community organizations around the state and nation** came together to learn and share resources. Next steps will link the CA Environmental Literacy project, Ten Strands, **and UC-CSU ECCLPs** to strategize and advocate for Climate Champions as a model and a vehicle for statewide scale-up.

Climate Champions also launched a public-facing website with links to curriculum and learning resources, and is now planning for ongoing engagement with teacher leaders and expanding the number of teachers teaching climate, across grades and multiple subjects.

Climate Champions website: climatechampions.ucsd.edu/
Climate Champions blog posts: climatechampions.ucsd.edu/in-the-news/

In related work, Renner also consulted with **Dr. Mishra Jyoti**, **UC San Diego Psychiatry faculty**, on her *Breathing Life to a Better Earth* project on mental health-related to climate change; the project will work with undergraduate students to develop a virtual-reality based environment for younger students that promotes mindfulness practices and self-efficacy when confronting the psychological challenges associated with the climate crisis. As just one of many projects, Renner also supported **SIO faculty** in NSF broader impact design, and faculty pursuing DoD funding for diversifying the student population pursuing advanced degrees in oceanography. Renner also supported the **Ocean STEM working group**, with **Drs. Sophia Merrifield** (**SIO**), **Jules Jaffe** (**SIO**), **Amy Eguchi** (**EDS), Jack Silberman, and Henrik Christiansen** (**Center for Contextual Robotics**), focused on broadening and diversifying participation among middle school students in engineering (sensing and robotics) and ocean science. As overall education design lead at Birch Aquarium, Renner spent a pandemic year growing programming meeting local learning needs, including scholarship funding for virtual Discovery Lab field trips, afterschool programs, and **Beach Science serving City Heights schools**.

Birch will also support summer programming serving **San Diego Unified low-income middle school students** (**96**) through a LevelUp grant with six week-long camps focused on Ocean STEM learning and careers.

Highlights CSSI Year 8 | CSSI Liaisons

In the CSSI, we stipend district liaisons who know their systems' needs and can help UC San Diego partners codesign necessary and desired local opportunities to learn. Here are a few highlights from this year.

Vista Unified School District liaison Kellie Fleming worked with Professor Tarun Glover of physics on an NSF CAREER grant to offer Back of the Envelope Physics Workshops for 11-12th grade students exploring phenomena- and observation-based physics. Fleming also helped **Qualcomm Institute** partners recruit Vista teachers for stipended summer workshops on nanotechnology infrastructure and helped SIO partners to recruit Vista teachers for explorations of ocean warming.

San Diego Unified School District liaison Shirley Miranda, as part of the CS-Listen NSF project, described earlier in this report, supported Morse High School students to develop workshops for 4th-grade students and a Morse Codes club (which held guest speaker panels from industry including NCWIT), to promote broad participation in Computer Science. **Under Miranda's lead**, **300 students from 47 schools registered for Tech Changemakers workshops that featured UC San Diego staff**.

Sweetwater Union High School District liaison Leo Ulloa supported **UC San Diego Math Professor Guershon Harel and UCSD Math Project director Ovie Soto** in DoD/STEM grant submissions to continue innovative mathematics coursework in Sweetwater. Ulloa also supported a collaboration between **Drs. Pamela Cosman**, **Curt Schurgers**, UCSD Dept. of Electrical and Computer Engineering, and Mr. Nevarez, **CTE Digital Electronics teacher at Olympian High School**, to develop short modules that introducing high school students to topics within communications engineering. Mr. Nevarez wrote in a testimonial,

> I wanted to thank you, Dr. Cosman, Dr. Schurgers and UCSD on a wonderful and successful implementation of the communications materials in my Digital Electronics class this year. I even got to write a small part of the research paper that Dr. Cosman and Dr. Schurgers were writing, which is a first for me! Most importantly the kids enjoyed the module despite the difficulties of being in distance learning and I have some awesome new communications technology teaching material to present to my fellow Digital Electronics colleagues within the district this summer.

Ulloa also helped run a pilot linking **UC San Diego's Halicioglu Data Science Institute** and Chula Vista Middle School in Automaton Engineering and Data Science and recruited UC San Diego faculty, staff, and students to support the Sweetwater STEM-Research Fair. Ulloa also helped link SUHSD teachers to professional development opportunities by UC San Diego faculty, including CaliBaja Webinars organized by **Dr. Olivia A. Graeve** (**Department of Mechanical and Aerospace Engineering**), Computer Science (CS) Supplementary Authorization training by **Dr. Beth Simon** (**Education Studies**) and SDNI "Nanotechnology Summer Institute for Middle and High School Teachers" by **Dr. Yves Theriault** (**Qualcomm Institute**).

Chula Vista Elementary School District liaison Michael Bruder worked on executing a *DoDEA MCASP Grant - STEAMing into Health Sciences*, won with support from researcher Monica Sweet of the CSSI. The grant will modify CVESD curriculum and develop a district "Health Station" that hosts student field trips for 4th graders to explore health science careers and additional medical-focused activities through problem-based learning challenges during and after school. See bit.ly/DoDEAGrant and CBS 8 News: Chula Vista Elementary District awarded $900K grant from Department of Defense. Bruder also supported 9 CVESD teachers and **318 students from 6 different schools** to participate in *SMILE - Scientists Making Impacts in Learning Environments*, another project supported by Sweet and in collaboration with **Nitya Bhaskaran**, **Community Teaching Lab Manager at Scripps Research**. The program provides teams of scientists to engage with students and teach unique lessons in the life sciences.

All this work occurred during a global pandemic, **in a moment of massive stress for educators**, **youth**, **and families**. **We are extremely proud to have pushed the CSSI and local opportunity to learn forward this year**.

Spreading the CSSI model

What if every university had a campus-wide broader impact infrastructure like CREATE/CSSI, with staff leveraging resources to co-create K-20 local opportunities to learn? Our team recently wrote a new overview titled "Leveraging a University to Create Local Opportunity to Learn" that begins to share our work publicly.

Contact micapollock@ucsd.edu with any questions about this report.

CSSI Communications
CSSI staff invites you to follow our social media platforms to learn about UC San Diego's community efforts with the San Diego region and world.

Sign up for our blog, CREATE at UC San Diego, Facebook, and Twitter account, and help us #CREATEequity!