

# HOW OFTEN DO STUDENTS HAVE A VOICE...

*...in advocating for STEM in THEIR schools?*

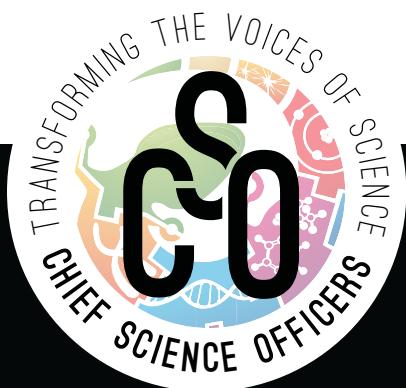


*...in making STEM connections in THEIR communities?*

*...in planning the jobs of THEIR future?*



Artwork drawn by John Drury of Drury Design Arts, documenting the 1st Annual CSO Summer Institute 2015



The time is now! Join U.S.A.'s first  
**CHIEF SCIENCE OFFICERS**

[www.chiefscienceofficers.org](http://www.chiefscienceofficers.org)



# CHIEF SCIENCE OFFICERS

A Student-led Intervention to Increase Interest in STEM

CSOs collaborating on their collective action project at the 2016 Capitol Summit



*This realization that kids need a voice*

sparked a powerful idea to put students at the center of STEM advocacy, student experience, and community action. The landscape for STEM education could be a lot different – and arguably more productive – with a few simple actions that embrace student leaders as voices for STEM.

*The overarching program goals are:*

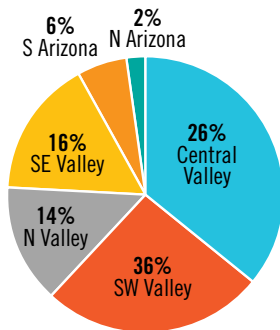
- ▶ **1 Create a pipeline of diverse STEM leaders**
- ▶ **2 Increase communication and collaboration among CSOs**
- ▶ **3 Enrich school STEM culture and career awareness**
- ▶ **4 Increase student voice in STEM conversations in the community**

# WHO IS A CHIEF SCIENCE OFFICER?

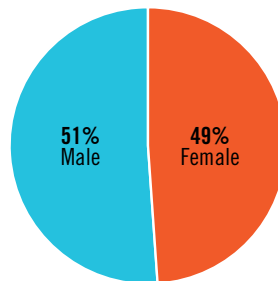
- 6th to 12th grade student
- **Elected** by their peers
- Demonstrates interest in science, technology and innovation
- Has a desire to impact their community
- Actively participates in a CSO training institute and year-round activities

The class of 2016-2017 included **120 schools in Arizona** electing over **220 total Chief Science Officers** or “CSOs”

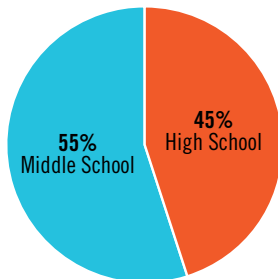
**CSOs BY REGION**



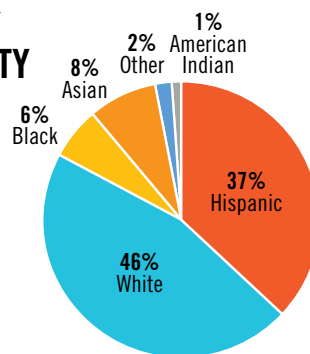
**CSOs BY GENDER**



**CSO SCHOOLS BY LEVEL**



**CSOs BY ETHNICITY**



*Macy Franklin*

“I want my school to have passion for science and STEM and more creativity by the end of the school year.”



*Moises Casa Grande*

“My mission is to help students find a passion in STEM.”



*CSO Karla Sundance*

“As a CSO, I hope to bring excitement about science to my school and crush gender roles of scientific careers.”



*Max Tucson Sonoran Schools*

“My vision as a CSO is to greatly increase interest in STEM by increasing community outreach and getting students excited to learn, enjoy and interact with every aspect of STEM.”

Data presented represents CSOs from the 2015/16 and 2017/18 classes.

CSOs presenting at the Arizona SciTech Thank You Event.



# 2017-2018 YEAR AT A GLANCE

**The CSO role is to be a STEM ambassador both in their school and the community.**

After being elected by their peers, students attend an induction institute to learn basic skills required to be a CSO. During the academic year they attend state cabinet meetings, interact with CSO peers online, and support STEM awareness activities both at their school and in the community.

## CSO REQUIREMENTS:

- **win an election** at their school to be their site's designated Chief Science Officer
- attend a Summer or Fall CSO **Leadership Institute**
- attend at least **two** regional or state-level **cabinet meetings**
- participate weekly in the **online Canvas forum**;
- develop an **online CSO profile**
- support at least one **STEM project, event, or activity at their school**
- participate in at least two **community events about STEM & education**



# CSO PROGRAM HIGHLIGHTS

## JULY

Summer Institute [1]

## SEPTEMBER

Fall Institute

AZ SciTech Season Kickoff [2]

## OCTOBER

CSO Capitol Summit [3]

## JANUARY

Connect2STEM Event [4]

## FEBRUARY

Statewide Cabinet Meeting [5]

Participate as leaders in Arizona SciTech Festival events throughout February and March [6]

## MARCH

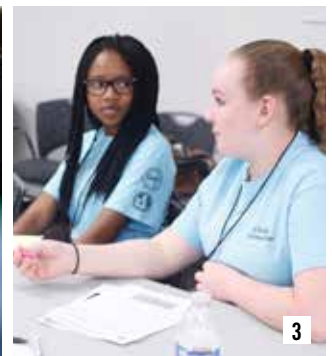
On-Campus action plan completion

## APRIL

Elections for 2018-2019 cohort begin

## MAY

Graduation Celebration [7]



Fall Institute PR and Communications session led by Trina Helquist (Orbital ATK) at the University of Advancing Technology.



# CSO TRAINING INSTITUTE

## CSOs build their skills as student STEM leaders at the training institute.

The Institute is one of the most important experiences for newly elected CSOs. They form lifelong bonds with like-minded students, define their STEM passions, and make action plans for the upcoming year. Sessions led by knowledgeable business and community leaders provide CSOs interactive, hands-on learning opportunities geared to practice workplace skills in communication, leadership, strategic planning, team building, and more.

## OBJECTIVES AND INSTITUTE SESSIONS

### Serving as a CSO: STEM literacy, attitude and awareness

Sessions: Visioning, Canvas Online Classroom, Academic Year Action Planning, STEM Explorations, Leadership (second-year growth track)

### Collective action and impact as a CSO cabinet

Sessions: Serving as a CSO, Team Building, Collective Action Planning

### Ambassador of STEM school culture

Sessions: SciTech Explorations, Networking, Public Relations

### Elevating STEM student voice in the Community

Sessions: Ambassador of STEM School Culture, Digital Storytelling

### Guiding principles for all sessions

1. Developing STEM workforce readiness
2. Cultivating, nurturing, and fostering a love of STEM
3. Elevating student voice
4. Ensuring diversity





Video profiles



Strategic planning

“ As a State Farm Jedi Mentor, I was impressed with the training the students received in speaking, writing blogs, networking and more. Many students shared this was the first time they were surrounded by people like themselves. It allowed them to open up and build connections with other students. The CSO program is a rare opportunity for students and industry to interact! ”

*Leann Steidinger*  
State Farm



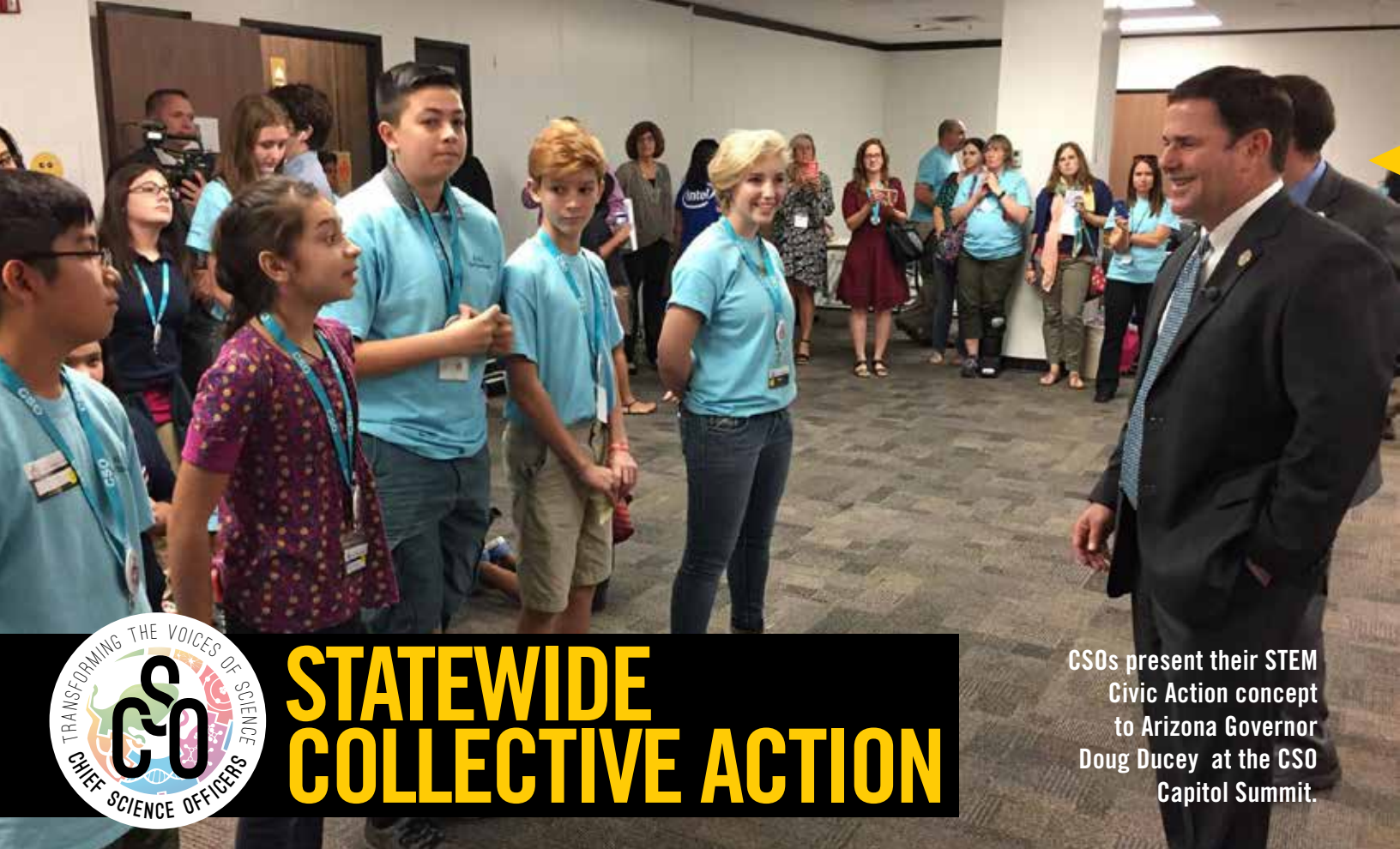
Networking 101



Team building

*Michele Walters*  
CSO parent

“My student loved the Institute – he talked 100 miles an hour all the way home about his ideas and time at GCU. He has a meeting scheduled with his principal next week! What 10 year old does that?!”



CSOs present their STEM Civic Action concept to Arizona Governor Doug Ducey at the CSO Capitol Summit.



# STATEWIDE COLLECTIVE ACTION

## Twice a year CSOs meet as a statewide cabinet.

Each year CSOs meet as a cabinet at the Arizona State Capitol and a leading business to work on key issues related to civic action and STEM. Through these experiences CSOs learn teamwork, the power of their collective voice and doors they can open by working together.

### COLLECTIVE ACTION

CSO collective action projects are improving STEM education and elevating student voice. Some sample projects include:

- The first National Technology Field Trip Day engaging **15+ technology organizations** opening their doors to engage **1000+ students**;
- An **online idea-sharing platform** for STEM educators;
- A **website** for CSOs to **recommend, review, and rate STEM events** and activities;
- Integrating **student voice** into the **Arizona State Board of Education** with an elected CSO;
- Utilizing digital media to **communicate legislative issues to kids**;
- **Helping our communities** reduce poverty, conserve water, reduce pollution, and improve personal safety through STEM awareness



“The CSO program is an innovative, Arizona grown model that we anticipate will transform the STEM climate. We are proud to be leading the path in producing the nation’s diverse civic STEM leaders.”

*Doug Ducey* Arizona Governor

## CAPITOL SUMMIT

**Location:** Arizona State Capitol

**Host:** Arizona Governor’s Office of Education

**Experience:** CSOs worked with the staffers, lobbyists, lawyers, media specialists, and their SciTech Jedi Mentors to develop collect action concepts around civic action and STEM. CSOs had the opportunity to then pitch their concepts directly to Governor Ducey.

## HONEYWELL STATE CABINET MEETING

**Location:** Deer Valley Airport

**Host:** Honeywell Aerospace

**Experience:** CSOs interacted with aerospace industry professionals and created roadmaps for their collective action projects. In addition, CSOs met STEM leaders including Honeywell’s Director of Flight Services, Kiah Erlich, and Google’s Global Education Evangelist, Jaime Casap.



CSOs working on their collective action project at the Honeywell Cabinet Meeting.



CSO *Devin Holbrook*

“It was a fun experience to see how a bill becomes law.”



CSO *Cassandra C.O. Greenfield*

“This experience [at Honeywell] helped me to improve how I communicate with new people, and how I work in teams.”



*Kiah Erlich*  
Honeywell

“It’s an honor to speak to Arizona’s smartest and most enthusiastic young minds who are destined to shape the future of America’s technical fields.”



# CSOs AS STEM AMBASSADORS

## Chief Science Officers serve as STEM ambassadors on and off campus.

CSOs bridge opportunities for their schools and work to build interest and excitement among their peers for STEM and STEM careers. In the community, CSOs cultivate partnerships and provide the student perspective in conversations about STEM and education with local businesses, media, and policymakers.

## EXAMPLES OF CSO IMPACT

- **SCHOOL SCIENCE FESTIVALS:** CSOs Dominique and Moises engaged **20+ student volunteers** and **300+ student presenters** at the Casa Grande High School District SciTech Festival.
- **EDUCATION ADVOCACY:** 78 West Valley CSOs **co-developed a Congressional brief with Congressman Raúl Grijalva** about the STEM education climate in their schools and barriers to enter STEM careers.
- **STEM CLUBS:** CSOs Angie and America **founded the Hermanas Club** to inspire **Hispanic Girls** about STEM at Alhambra High School.
- **NATIONAL CONFERENCES:** CSOs Dana and Kimberly provided the **student perspective** on women and mentorship at the **national Million Women Mentor's Conference**.
- **SCHOOL STEM CULTURE:** Kyrene Del Pueblo CSOs infused **Science Fact Challenges** on their **school's morning announcements** by working with their school administration and peers.



- **PROGRAM DEVELOPMENT:** CSO America presented the CSO program to the Arizona Community Foundation Board leading to a grant of 75K for CSO growth in Phoenix.
- **GREEN EDUCATION:** CSOs Kate and Jacob launched a recycling program at Bridges Elementary by engaging local city officials, school administration, and their peers.
- **COMMUNITY STEM ENGAGEMENT:** CSOs Emilio, Ben, and Lauren showcased interactive STEM activities to the public at the ASU Homecoming Block Party.
- **FEEDER SCHOOLS:** CSOs Jacob, Alexandra and Ryan demonstrated their “Science is Fun!” interactive presentations at multiple feeder elementary schools.



Casa Grande SciTech Festival



CSOs at Connect2STEM media event



CSO moderated panel at the Southwest Makerfest.



CSOs tabling at the Tale of 2 Cities event



CSO tour at Orbital ATK



CSO Elaina  
AZ College Prep

“I helped create a process for my school’s STEM-related clubs to put on demonstrations during lunch on Fridays. This has had a positive influence on the students and our Science Club grew from 10 to 40 people.”



CSO Angie  
Alhambra High School

“At ASU and Honeywell’s Dreams Soar event, I moderated the panel. I learned that there are many opportunities in the world of STEAM, and I too can aim for anything as long as I remain passionate.”



CSO Takaia  
Coyote Trails

“At my school we just recently had our very first annual STEM Night, and it was a blast! I feel like I am bringing more STEM to my school and getting kids even more excited for it.”

Honeywell's Chris Hickenbottom of Honeywell shows CSOs the inside of an airplane engine



## CONNECTION WITH THE WORKFORCE

Throughout the year, CSOs work with industry professionals to apply their knowledge in real-world settings.

CSOs practice important employability skills such as teamwork, work ethic, critical thinking, problem-solving, and verbal and written communication with STEM professionals both on and off campus.

### THE POWER OF MENTORSHIP

CSOs work with “SciTech Jedi” or community mentors who bring real world expertise and support. During the 2016-17 season, **65+ SciTech Jedi** from a wide variety of organizations supported the training institutes, hosted events at their sites, and visited with CSO at their schools. See page 18 for full list of engaged organizations.

### IN SCHOOL EXAMPLES

- **Orbital ATK's** JR Morris worked with Hamilton High CSOs to put together a rocket launch activity as part of their on-campus action plan to **enhance their school's science and engineering fair**.
- **Pinnacle Transplant's** Russ Yelton educated North Valley CSOs about innovations in **transplant science** and **skills needed** to enter bioscience careers.
- **Intel's** SciTech Jedi Mentor Ash mentored Metrotech CSOs on their “**STEAM Week**” action plans and follow-up documentation.





“ This is a great program to expose students to STEM career opportunities in their communities while encouraging them to take advantage of local workforce needs. ”

SciTech Jedi  
*Angie Harmon*, Freeport McMoRan

## INSTITUTE EXAMPLES

- **State Farm’s** Gus Miranda led a session about **how to network** with adults and effectively use their **CSO business cards**.
- **Orbital ATK’s** Trina Helquist, shared her experience on **professionalism** and **crisis communication** with CSO regional teams.
- **Phoenix Analysis and Design Technologies’** engineers work with CSOs to design 3D badges.
- **Castelazo Content’s** Molly Castelazo introduced CSOs to **gender equity in the workplace** in a strategic planning discussion.
- The **State Farm** IT Team introduced the concept of **coding** by making PB&J sandwiches.

## CABINET MEETING EXAMPLES

- **Google Chief Education Evangelist** Jaime Casap challenged CSOs to **reframe their thinking** to build their skills to address problems they want to solve in their future.
- **Flinn Foundation’s** Nancy Welch mentored CSO teams on their **collective action** and **policy plans**.
- **Honeywell’s** Bob Witwer inspired CSOs about **future careers in Aerospace** and the importance of their work as a CSO.

## IN THE WORKPLACE EXAMPLES

- **Advanced Business Learning** hosted Centerra Mirage STEM Academy’s 7th graders to inspire them about the **field of cybersecurity**.
- **PerfOpt Technologies’** Raman Khurana introduced CSOs to **immersive technologies** at their 3D design lab in Avondale.



“I went to State Farm’s Code Day and was inspired to learn more about making apps. The CSO program arranged for me to visit State Farm, and it was very exciting to meet female IT professionals and discuss with them how my ideas can become implemented.”

**CSO** *Lauren*  
Vista Del Sur

“CSO students: think about the problem you want to solve. Then ask, ‘what do I need to learn to solve that problem?’ What are the knowledge, skills, and abilities I need to build?”

*Jaime Casap*  
Google





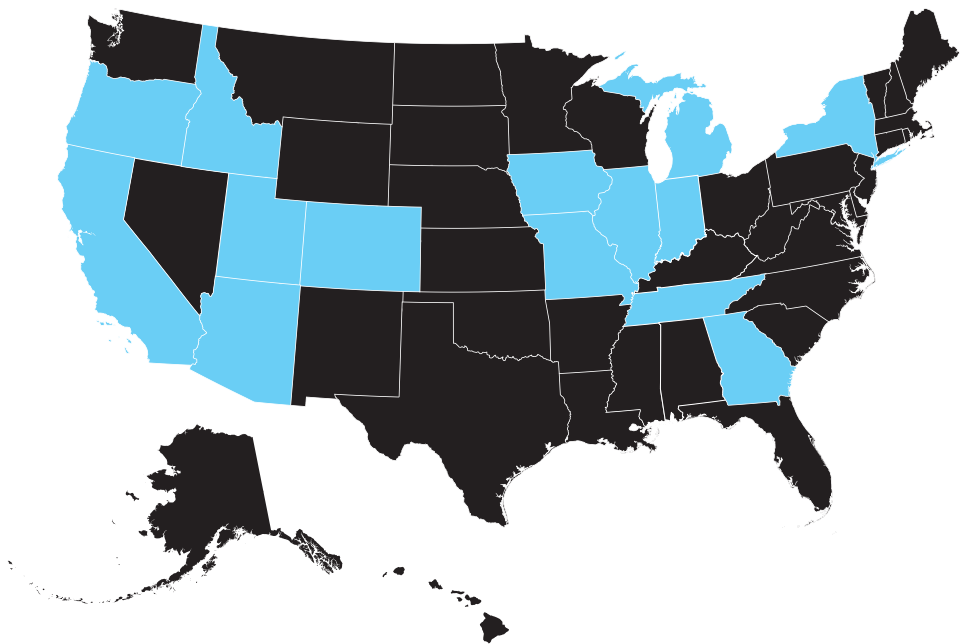
# NATIONAL REACH

CSO Sage meets President Obama as a part of the White House Kid Science Advisors

## CSOs are extending their voice nationally.

CSOs have caught attention across the United States by presenting at national conferences, publishing in premiere science journals, and meeting with President Obama himself. Based on this growing interest, leaders across the country are working to launch CSO cabinets in their regions.

### "RAINMAKERS" ARE LAUNCHING CSO PROGRAMS IN THEIR REGIONS



**REGIONS INCLUDE:** Oregon, Utah, Idaho, Colorado, Michigan, New York, Kansas City, Los Angeles, Orange County, San Diego, Atlanta



“ Thanks to my experiences at [the Honeywell Cabinet Meeting], I was inspired to create a program that got all the way to former President Barack Obama’s desk in Washington, D.C. ”

CSO *Sage* Centerra Mirage STEM Academy



## EXAMPLES OF CSO ENGAGEMENT NATIONALLY

- CSOs America, Jonathan, Dhruv, Dominique, Marie and Sage presented the CSO program to senior leadership at the **Office of Science and Technology Policy including President Obama’s Science and Technology Advisor Dr. John Holdren and US Chief Technology Officer Megan Smith.**
- CSOs Megan and Macy joined two dozen students in Washington DC to share their voice on **International Students Day.**
- CSO Dhruv added the student perspective at a **White House Summit on the Next Generation High Schools.** He later published in **Science Magazine** about his visits to the White House as a Chief Science Officer.
- Ten CSOs from Pendergast District held a **teleconference with NASA’s Dr. Steve Levin.**

## NATIONAL PRESS

- CSOs have been included in two **White House Fact Sheets** related to Computer Science for All.
- CSOs have been highlighted in **Science Magazine** as an “Outside the Tower” feature.
- CSO Sage was included in a **Washington Post Article** about his appointment as a Kid Science Advisor. **President Obama’s Facebook post** about the Kid Science Advisors **received nearly 800,000 views.**

“[The CSO program has] figured out a model that could be really important for the whole future of our country... The president is so proud of you guys.”

*Megan Smith,*  
Former White House Chief  
Technology Officer

“The CSO program has been welcomed with enthusiasm in Southern Oregon. We have commitments from schools in five districts with the potential to serve 3,782 students in our region and expect five more districts to join for the inaugural cohort.”

*Summer Brandon*  
Oregon Rainmaker



CSOs meet with Megan Smith and John Holdren at the White House



National Rainmakers’ meeting to discuss CSO rollout in their regions.



# PROGRAM RESULTS

**The Chief Science Officer initiative is committed to creating a measurable impact.**

Teachers, parents, community members, and CSOs report that the program is leading to student growth and impact in schools and in the broader community.

## NSF ITEST GRANT PRELIMINARY EVALUATION RESULTS

**100% of those who attended presentations by CSOs or participated in focus groups reported the following:**

- Students should have a voice in the conversation about STEM and the workplace;
- They better understand how to position students in workforce context;
- They better understand how to engage and support students and schools;
- They will further support CSOs in improving STEM opportunities and resources.

**100% of teachers and parents in a focus group reported the following about the business and community partner engagement:**

- They attributed the personal growth they have seen in their CSO to the program;
- They saw the benefit of the CSOs connecting at the statewide meetings;
- They observed commitment of local businesses and resources to their schools.



## CSOS REFLECT ON THEIR INVOLVEMENT

CSOs reported significant\* personal growth at the end of the summer institute with their:

- Confidence to communicate their role as a CSO
- Connectivity to program, peers and the STEM community
- Preparedness to carry out their role as a CSO

“Being a CSO increased my...”\*\*

- Interest in college or higher education 100%
- Interest in a STEM career 95%
- Awareness of science in everyday life 98%
- Interest to be a community STEM leader 82%
- Connection with the STEM community 90%

“I made personal progress with...”\*\*

- Ensuring student voice in STEM discussions 87%
- Inspiring my peers about STEM 87%
- Building relationships with the community 85%
- Innovating what it means to be a CSO 90%
- Meeting my personal CSO goals 89%
- Addressing state challenges in STEM 84%

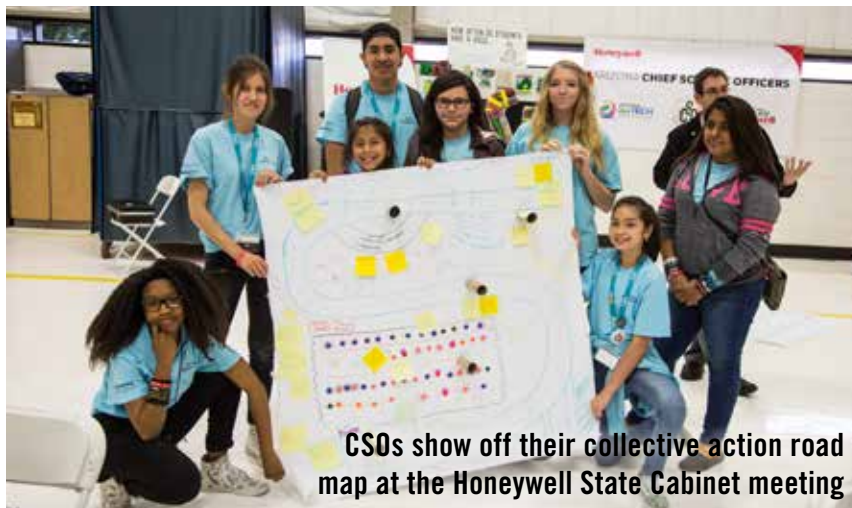
“I am most proud to have...”\*\*\*

- Met with my Congressman 21%
- Influenced others in STEM 18%
- Increased STEM awareness at school 18%
- Increased peer interest in STEM 14%
- Been elected as a CSO 14%
- Become a respected leader and representative 14%

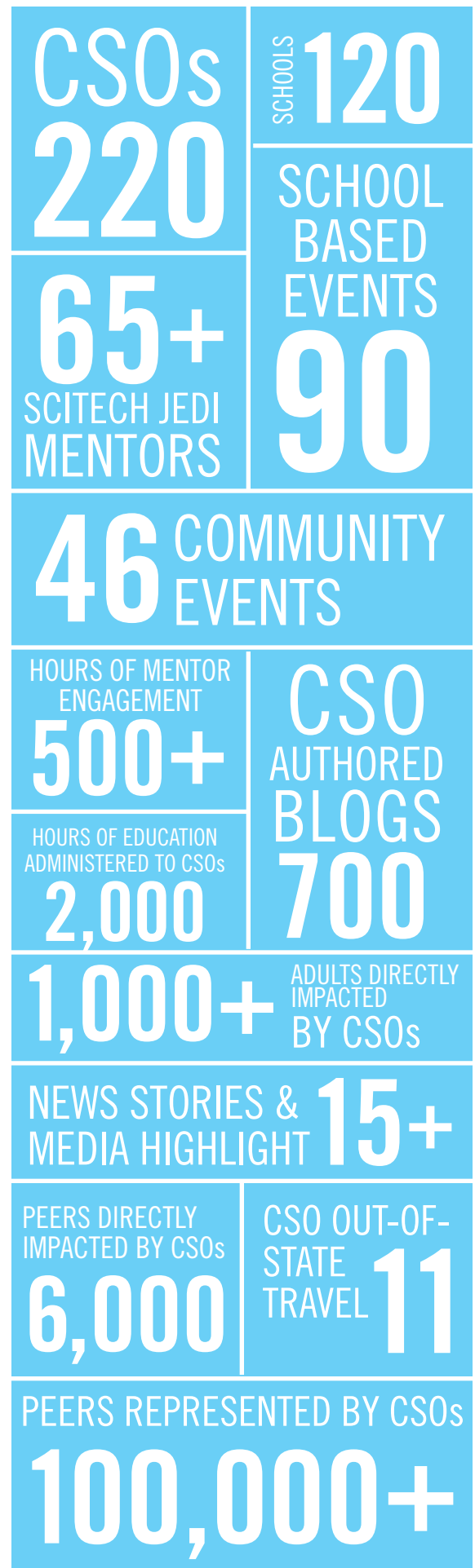
\* A total of 75 CSOs were surveyed on a 5 point Lichard scale before and after the institute in the above categories. A T-test analysis was run for each category and resulted in P values less than 0.0001.

\*\*Based on responses from a total of 45 CSOs that completed the end-of-the-year evaluations

\*\*\* Open ended responses by 45 CSOs were placed in more general categories related to what they were most proud to of.



CSOs show off their collective action road map at the Honeywell State Cabinet meeting



Jedi Mentors guide CSOs as they work on their collective action projects



# JOIN OUR STATEWIDE PARTNERSHIP

## Expansive Support Systems Ensure Success

It takes a community to ensure CSOs reach their full potential. School administrators, the program team, teachers, parents, and business and community leaders join forces in support of these exceptional students.

## BUSINESS & COMMUNITY PARTNERS

- Arizona Central Credit Union
- Arizona State University
- Castelazo Content
- Cox Communications
- Drury Design
- Flying Overtime
- Flinn Foundation
- Freeport McMoRan
- Grand Canyon University
- Honeywell
- Intel
- Local First Arizona
- Maricopa Community College
- OnTop Technology Corp.
- Orbital ATK
- PADT Inc.
- PerfOpt
- Pinnacle Transplant Technologies
- SRP
- State Farm
- TGen
- Tonto Creek Camp
- University of Advancing Technology



# SCHOOLS ACROSS ARIZONA

## CENTRAL VALLEY

- Cartwright ESD
- Creighton ESD
- Isaac ESD
- Kyrene ESD
- Laveen ESD
- Madison ESD
- Phoenix ESD
- Phoenix UHSD
- Roosevelt ESD
- SySTEM K12
- Washington ESD School District

## NORTH VALLEY

- Agua Fria HSD
- Aguila ESD
- Alhambra ESD
- Cave Creek USD
- Deer Valley USD
- Dysart USD
- Imagine Prep
- Rancho Solano Prep School
- Pardes Jewish Day School
- Peoria USD
- Salt River Pima District

## NORTHERN ARIZONA

- Holbrook USD
- Sequoia Village School
- Show Low SD

## SOUTHEAST VALLEY

- Chandler USD
- Gilbert Public Schools
- Higley USD
- Mesa Public Schools

## SOUTHERN ARIZONA

- Casa Grande ESD
- Casa Grande HSD
- Marana School District
- Yuma UHSD

## SOUTHWEST VALLEY

- Agua Fria High School District
- Avondale ESD
- Buckeye ESD
- Buckeye UHSD
- Liberty ESD
- Littleton ESD
- Pendergast ESD
- Saddle Mountain USD
- Tolleson ESD
- Tolleson UHSD
- Trivium Prep Academy

## STATEWIDE

- Sonoran Schools



*Deepa Iyer*

**CSO PARENT**

“The CSO program has allowed my student to develop as a leader while pursuing science initiatives with passion and enthusiasm.”



*Ron Alto*  
**HONEYWELL**

“The program you have put in place is outstanding, we were most impressed.”



*Shawn Jordan*  
**PH.D.**

**ASU IRA A. FULTON SCHOOL OF ENGINEERING**

“You’ve created an outstanding model that truly empowers kids to make change that they care about.”



*Anthony Pietrangeli*  
**Kenilworth Elementary**

“The support from our 2 CSO’s helped us to build a STEAM identity at Kenilworth. They are my go-to people when planning our STEAM events and classroom programming.”

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# THE CHIEF SCIENCE OFFICERS THANK OUR GENEROUS SPONSORS

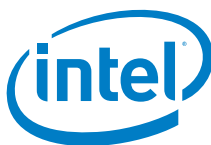
## PLATINUM



## GOLD



## SILVER



## BRONZE



## COPPER



The Chief Science Officer Program is a collaborative initiative of



ARIZONA  
COMMERCE  
AUTHORITY

and



ARIZONA  
TECHNOLOGY  
COUNCIL  
FOUNDATION

A creation of



ARIZONA  
SCITECH