

# Recruiting Future STEM and CTE Teachers Through MakerSpaces

## The problem

"This is college. If they cannot meet the requirements, then that is not my problem"

"We have pre-requisites and standards."

"We have rigid standards in STEM."

"I don't know why more students don't take our advanced courses."

"This is how I teach."

"Those students don't have the study skills they need to succeed in my class."

"We have our expectations."



At our college student data around gender, ethnicity, student socio-economic status showed we were not serving very specific categories of students in STEM. Disproportionately impacted student categories at CCSF are broken out by Gender, Underrepresented Minorities (including African American, Latinx, and Filipino), Veterans, DSPS, Foster Youth and First-Generation College Students.

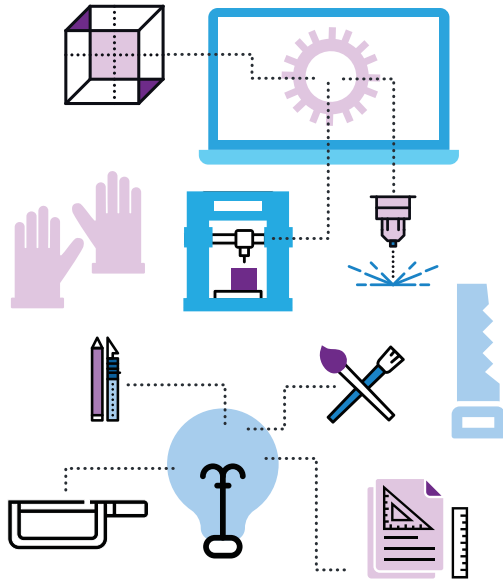
## Why MakerSpaces?

The California Community Colleges funded in 2016, an initiative entitled CCCMAKER, designed to grow a system of Makerspaces, align 21st Century skills with STEAM and STEM research and practice, and develop a community of practice. At CCSF, 4 locations were developed that comprised the CCSF MakerSphere, including a SMART Hub, Collaboratory, VR Studio and Industrial Skilled Trades Lab. Collaborating Departments include Computer Networking, Child Development & Family Studies (including the Teacher Prep Center), Art, Library, Automotive, Construction, Skilled Trades, Computer Science, Architecture and Visual Media.

By rethinking learning spaces and re-imagining laboratory experiences, students became participants and decision-makers in inclusive spaces and students with limited experiences and success in traditional STEM courses were more empowered.

This curricular innovation that introduced 21st Century NEXT GEN skills was important to not only share with current teachers at all grade levels, but also seemed like a promising recruitment strategy for developing future teachers with a commitment to hands-on and experiential learning and shared project goals and experimentation.

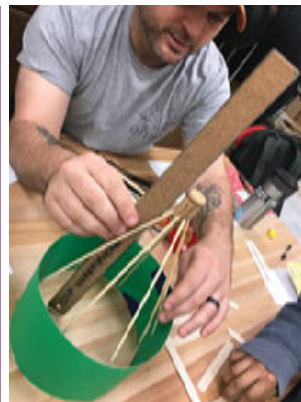
## Elements of a MakerSpace



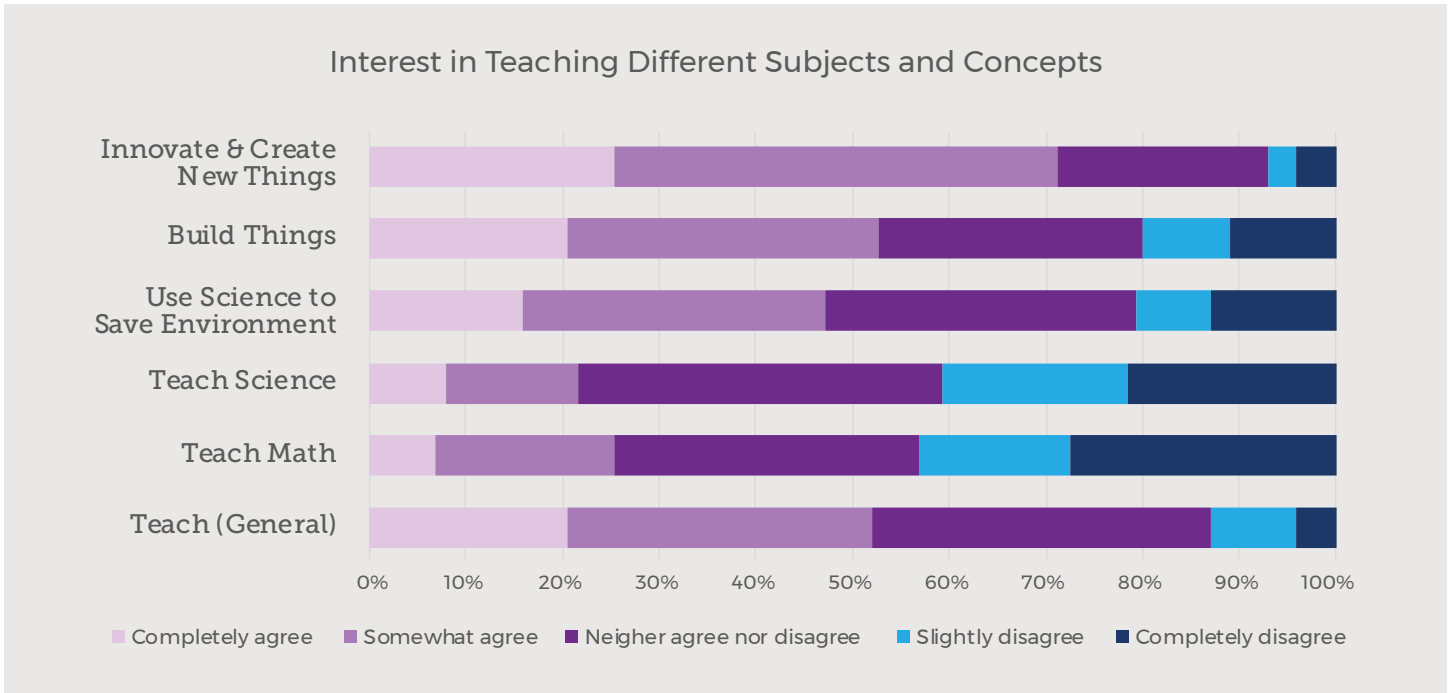
- ➔ Makerspaces are different than a traditional science classroom
- ➔ Few lectures
- ➔ Next GEN Equipment and Tools
- ➔ Modular furniture meant to foster collaboration
- ➔ Space designed for student agency and inclusivity
- ➔ Student centered rules and practices
- ➔ Project-based learning
- ➔ Tools from across disciplines in one space
- ➔ Allows for experimentation with a proven strategy
- ➔ Initiative backed by research

## Who has used the CCSF MakerSpace?

“Use the technology in context to solve a problem not just teach the skills in a vacuum.”



## Case for Makerspace as a recruitment tool for teaching



### Benefits of this strategy

- Leads to science lab success
- Fosters courage
- Dispels fear of failure
- Opens a door in the science building for disproportionately impacted students
- No prerequisites to enter
- Develops skills in existing teachers
- Creates a teacher recruitment pool in STEM/CTE that more closely matches the K-12 and community college student population
- Fosters intentional teaching
- Teaches Next GEN skills with Next GEN impacts

### Courses Developed

- CDEV 41B Issues: Teacher Seminar
- “Make, Create, Innovate”
- ChangeMakers Mini-Conference
- MAKR 100 Practices of Making, satisfies GE Area E
- MAKR 33 Makerspaces and Making for Teachers
- MAKR 400 Capstone
- MAKR 1000 Supervised Making (Non-Credit)
- CNIT 34 Technology for Teachers
- CNIT 214 Internet of Things



## Description of Challenge – CTE Teacher Shortages in the Bay Region

Teachers are the engines that power our economy. They will be essential to the Bay Area’s economic revitalization and recovery during the current health crisis. Growth in every sector is dependent on the recruitment and identification of a cadre of high quality, responsive and skilled Career Technical Education (CTE) teachers. Additionally, training for a workforce in fields that have yet to be imagined will depend on a supply of teachers with cutting edge skills who can spark innovation and discovery.



### What are the impacts of teacher shortages in the Bay region?

- Unemployment and retraining needs during the COVID 19 pandemic require an addition of new and fast-track training programs in CTE. Key faculty are needed quickly in critical sectors.
- Fewer high school and community college pathways are available to respond to labor market needs, due to STEM and CTE teacher shortages.
- Program growth is determined by teacher shortages as opposed to student and labor market demand.
- Fewer pathways in technical areas in high school due to shortages of qualified teachers results in fewer prepared community college students in STEM/CTE areas.
- Fewer opportunities to complete prerequisites and introductory courses in linked pathways.
- Students spend too much time in college programs that are impacted, which delays their entry into the workforce.
- Students may be getting less than the best instruction with faculty who are not highly qualified - because community colleges can’t attract highly qualified teachers.
- Less qualified STEM/CTE teachers in TK-12 negatively impact student outcomes.
- Underqualified teachers disproportionately impact students of color.

Contact us to find out about the link between **MakerSpaces** and **recruiting and preparing teachers for K12** – [kwhite@ccsf.edu](mailto:kwhite@ccsf.edu) or [mclancy@ccsf.edu](mailto:mclancy@ccsf.edu)

Like us:

f t i @teachforthebay

Find us online:

[teachforthebay.com](http://teachforthebay.com)



[ccsf.edu](http://ccsf.edu)



[nsf.gov](http://nsf.gov)



[baccc.net](http://baccc.net)

**National Science Foundation ATE Project – Growing CTE and STEM Teachers**

Kathleen White, PI CCSF, Teacher Preparation Project, Child Development & Family Studies Dept.  
Maura Devlin Clancy, Co-PI, MakerSpaces, CNIT Dept.

**City College of San Francisco**

50 Frida Kahlo Way - MUB 247  
San Francisco, CA 94112  
[kwhite@ccsf.edu](mailto:kwhite@ccsf.edu)  
[mclancy@ccsf.edu](mailto:mclancy@ccsf.edu)