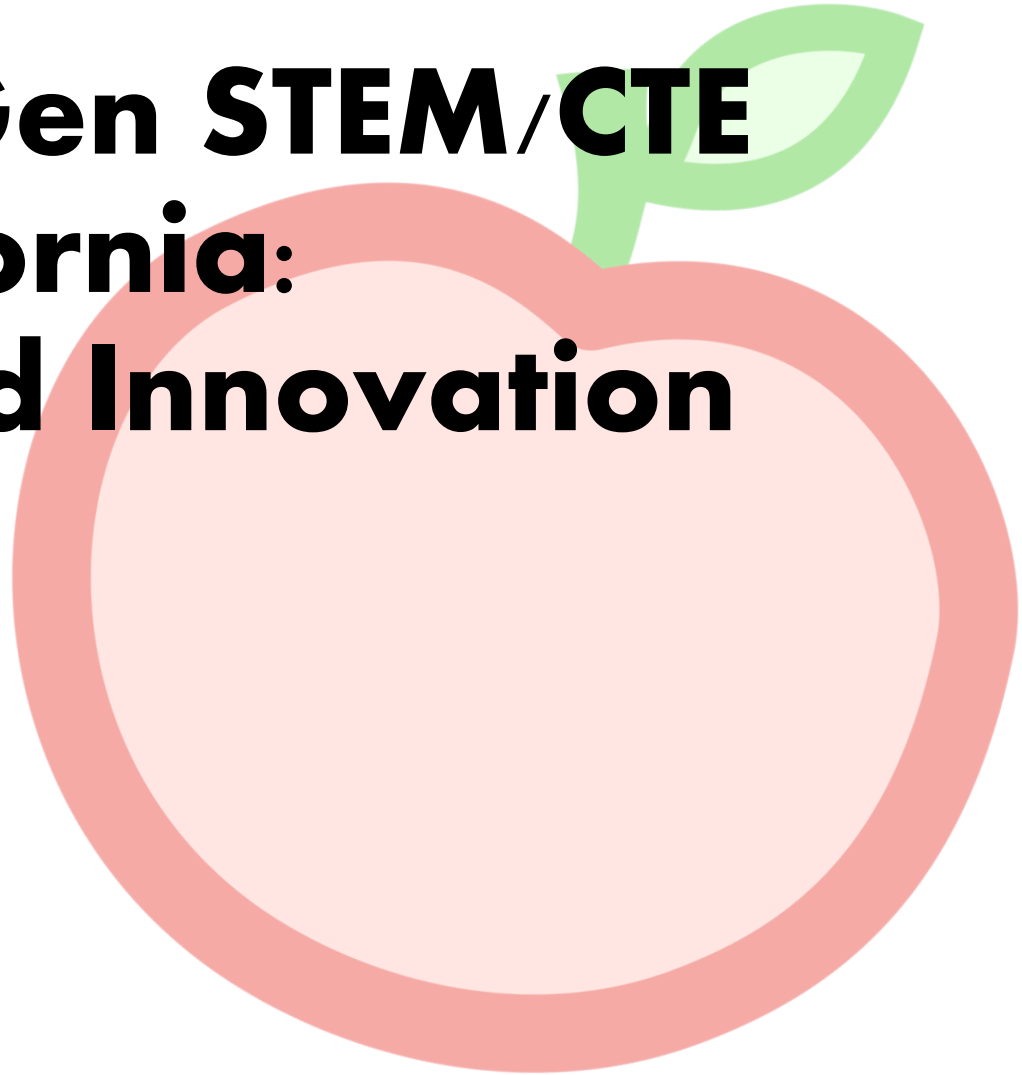
Preparing NextGen STEM/CTE Teachers in California: Makerspaces and Innovation



Presenters

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NSF ATE Project: Growing CTE/STEM Teachers DUE 1801099

Acknowledgements

CALIFORNIA COMMUNITY COLLEGES
Teacher Preparation Programs

maker SPHERE
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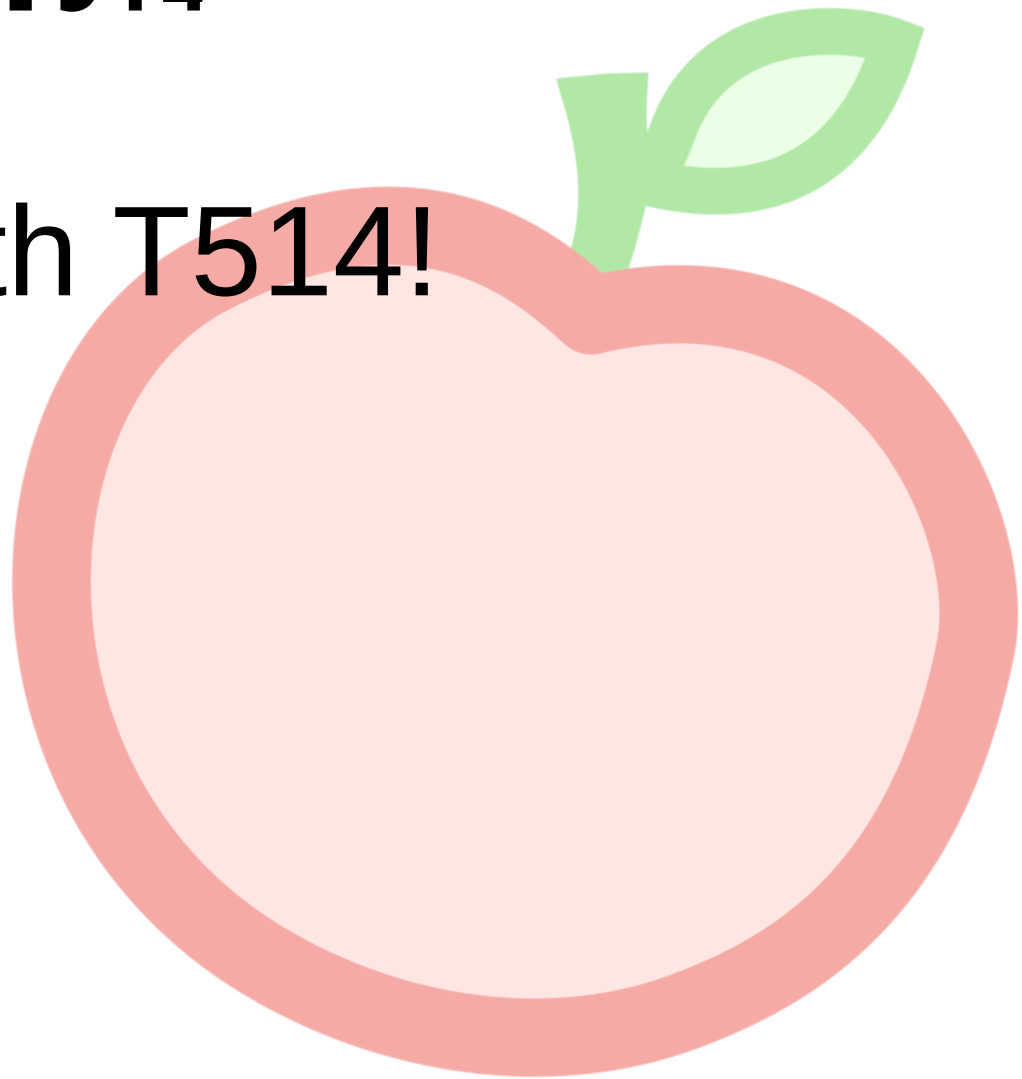
DUE 1801099

Showcase II Booth T514

Please visit our Booth T514!
3:45 - 6:00 PM



How did you become a teacher?

Join by Web

1. Go to **PollEv.com**
2. Enter **MAURAD075**
3. Respond to activity

Join by Text

1. Text **MAURAD075** to **22333**
2. Text in your message

pollev.com/maurad075

Critical Need for Teachers in CA & SF Bay Area Shortages in 12 County Region

- 80% of TK-12 districts in CA report teacher shortages continue and in some cases are getting worse (Learning Policy Institute, 2018)
- Over the next 5 years, projected
  - +124,000 openings **annually** in CA for a cluster of 20 teacher occupations.
  - Nearly 28,000 openings annually (139,000/5 years) in the SF Bay Region for 20 teacher occupations, (about 20% of all teacher openings in CA)
- Critical teacher shortages in TK-12 STEM, Special Education, and CTE.
- Because foundational STEM skills are required for many in demand jobs, teacher shortages in STEM disciplines impact the career pathways that prepare students for these jobs.

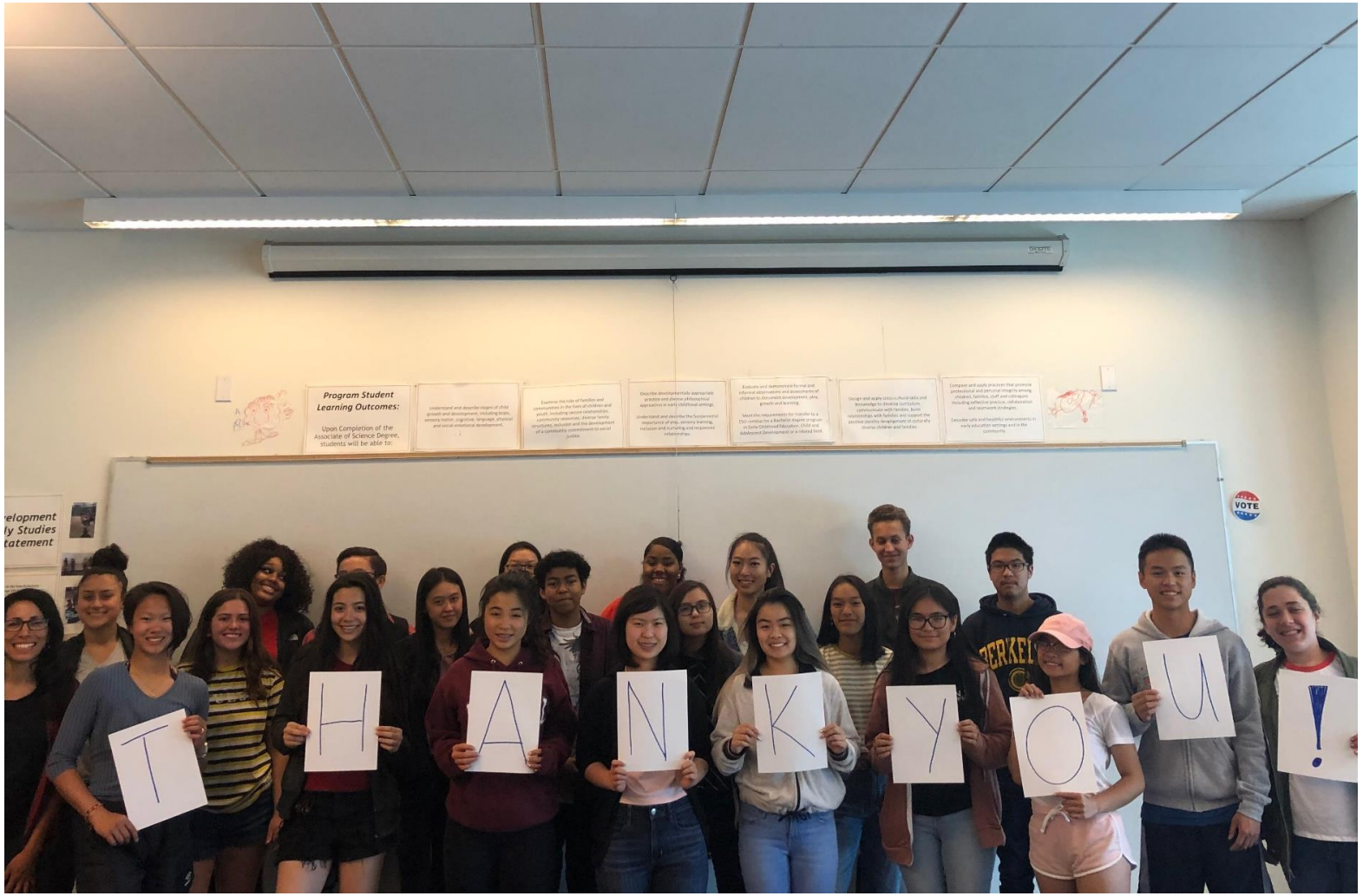
EXIT

Community College Chancellors Office SF Bay Area Regional Strong Workforce, Local Area Funders and National Science Foundation Funds Support this Work

STEM/CTE Teacher Preparation Pipeline (TPP), BACCC Regional Collaborative

Goal: To provide a regional model of contextualized and supported teacher preparation that successfully recruits, trains and supports existing and future Early Childhood Education (ECE), Transitional Kindergarten (TK) – 12 classroom teachers and community college educators throughout the region, especially in STEM and CTE

TPP serves all emerging and priority industry sectors within the community college, as it responds to the pressing teacher shortage in the SF Bay region.


Program Student Learning Outcomes:
Upon Completion of the Associate of Science Degree, students will be able to:
VOTE
THANK YOU!

San Francisco Bay Area Region

- Living wage data in the region defines family of 4 earning $98,000 as lower income and barely meeting living wage.
- Housing costs are exorbitant → $3,500/m rent for 1 bdrm apartment
- High employment allows for competition for college educated employees (especially in STEM) – Median Teacher Wage at $72,000
- Growth in Sector Specific Career Pathways: Wastewater Treatment, HVAC, Cybersecurity, Allied Health, Computer Networking, Business, engineering, etc. is impacted due to lack of teachers
- Dual-enrollment (high school to community college) is growing in the region and teacher shortages in TK-12 impact viability of pathways.

Child Development &
Family Studies Department

Demand for Community College Teachers Significant in SF Bay Area

Community colleges are experiencing significant faculty hiring challenges. Key areas of need include:

- Nursing
- Allied Health
- Math
- Chemistry
- Computer Science/ Computer Information Systems (CIS)
- Business

Based on 2018 survey of Bay Region Community College Human Resources Directors

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Supply and Demand

- **16,500** new teacher credentials issued in California, which includes the California Institution of Higher Education-Prepared, District-Prepared and Out of State/Out of Country-Prepared pathways
- # of credentials awarded annually falls far short of the number of annual openings for teachers across the state.
- ~ 60% of students who earn a teaching credential at a California State University (CSU) begin their path to teaching at a community college.
- 22 of the 23 CSUs in CA have teacher education programs that work closely with California Community Colleges to prepare future teachers,
- Over half of students graduating from CSUs completing their lower division work at a community college.

Source: 2016-17 California Commission on Teacher Credentialing report

Gaps and Challenges

- Data Sharing and Data Alignment
- TOP CODES for Future Teachers
- Identifying (coding and tracking) inter and intra disciplinary students at the community college level
- No common MOU with CSU and UC system
- Losing future teachers at the community college level, at transfer and before declaration (defining major)
- Commission on Teacher Credentialing process is cumbersome, complicated and not easy to explain

Strategies for Creating Diverse Teachers at CCSF

- Paid internship, fieldwork, work experience courses, paid employment with children and youth. Students need to work!
- ECE, after-school, youth work, paraprofessional jobs for college duration
- Choose “high hanging fruit” - students in credit recovery, with academic challenges, in basic skills classes and disconnected from school can make authentic and relevant teachers
- Intentionally serve disproportionately impacted students.
- No screening for GPA, past academic performance or test scores. Screen for desire and passion
- Secure external and internal funds to create paid employment opportunities (SFUSD, DCYF and CCSF (work –study/lab-aide) pays GYO students enrolled at CCSF in dual-enrollment to work in school sites).

Strategies for Creating Diverse Teachers at CCSF

- Easy access to ind. counseling and advising for teacher pathway support.
- Academic counselors to provide workshops, class visits in key courses and staff outreach events
- Understand that students often “discover” teaching and that teaching finds them. Exposure to careers in education and at school sites.
- Offer teaching as a career. Tell our own story.
- Discuss benefits of teaching: reduced school year, benefits, retirement systems, work-life balance, summer employment opportunities, autonomy in the classroom, social justice
- Students committed to social justice and helping their community make potential future teachers. Understand the youth voice and time it takes to choose teaching.

Why Makerspace?

- Dual-enrollment
  275 students in Educator Pathway in Summer 2019
- Expanding Professional Development for Current Teachers
- Partnering with other college programs to encourage interest in teaching → Makerspace

CCC Maker Initiative

- **$17,000,000 investment**
- **3-year project (2016-19)**
- **First statewide community college initiative to:**

1) **Grow a statewide network of college makerspaces.**
2) **Develop a CCC Maker 'Community of Practice' model.**
3) **Align 21st century skills with STEM/STEAM research and practice.**
4) **Support work-based opportunities for students.**
5) **Disseminate information and resources to ecosystem.**

Funded by the California Community College Chancellor's Office 2016-19

California Makerspace Start Up Guide - https://cccmaker.com/about/maker-guides/

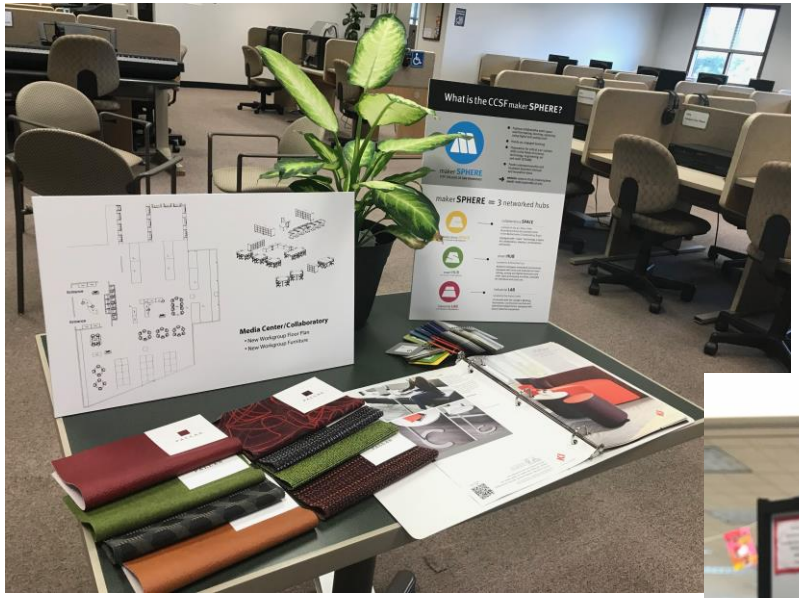
MakerSPHERE

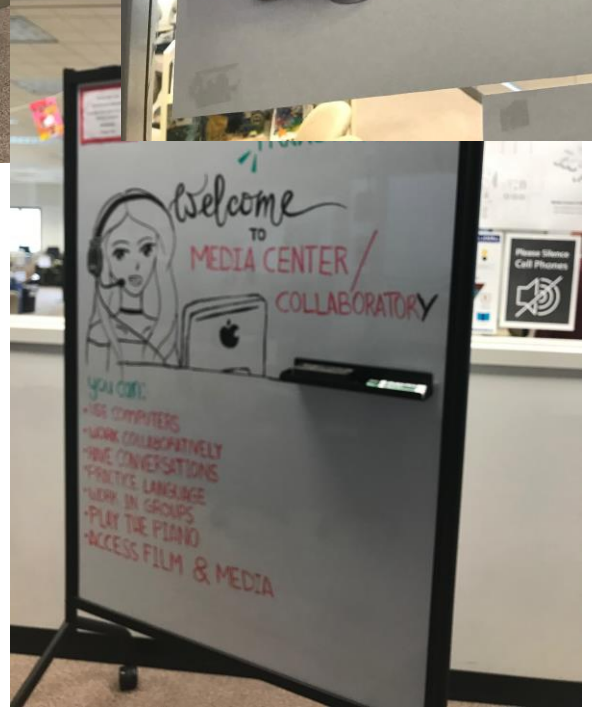
- MakerSPHERE project – connected spaces through both technology& community of practice
  - Collaboratory, Main Campus Library
  - SmartHUB, School of STEM
  - Industrial Lab, Evans Trades Campus
  - Allied Health VR Studio, JAD Allied Health Campus

Rethinking Learning Spaces

smart HUB
CITY COLLEGE OF SAN FRANCISCO

Rethinking Learning Spaces

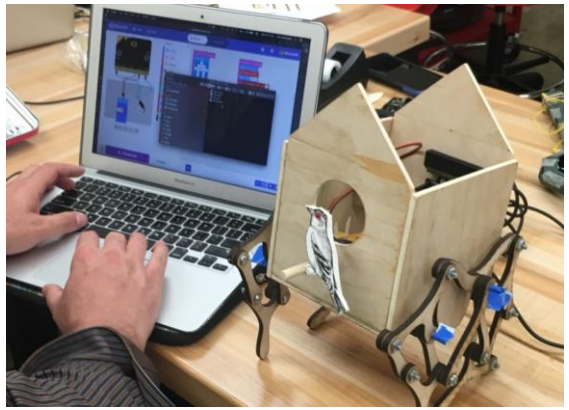




Exposure to STEM/CTE in Makerspace

- MAKR 100 Practices of Making – Credit class, 3 units
- Entry level students, typically no experience
- Satisfies CCSF GE Area E and transfers to CSU

1. Paper Craft and Engineering
2. Intro to Coding, Physical Computing and IoT
3. 3D Design, fabrication and construction



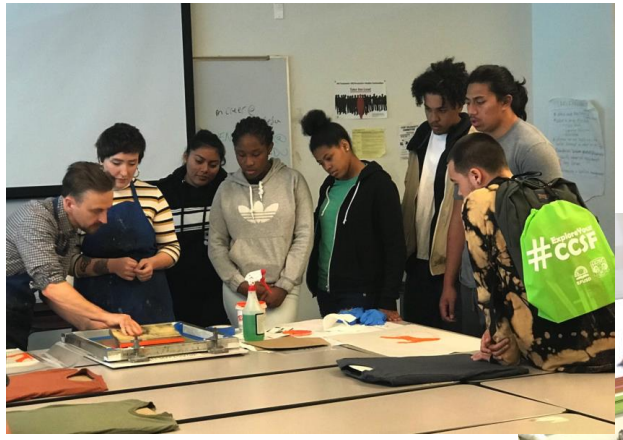
Equipment, tools and technology

Digital Fabrication
- Universal Laser Cutter
- Vinyl cutter
- 3D Printers
- Heat press

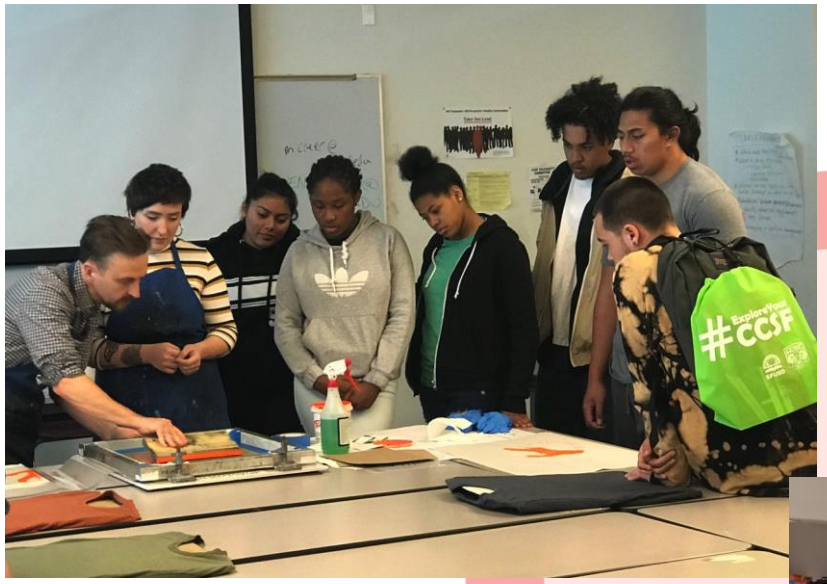
Shop Tools
- Band saw
- Drill press
- Hand tools
- Solding irons

Paper Craft + Engineering
- X-Acto knives
- Cutting mats
- Rulers
- Bone creaser
- Glue guns

Computational
- Micro:Bit
- Raspberry Pi
- Arduino
- Cisco TelePresence
- Soldering stations
- Tinkering materials



Who will be included in your makerspace?



Curriculum

- MAKR 100 Practices of Making
- MAKR 400 Maker Capstone
- MAKR 33 Making and Makerspaces for Teachers
- MAKR 1000 Supervised Making (In Progress)
- Outlines available at the booth and also here

https://sites.google.com/mail.ccsf.edu/nextgenteachers/home

Curriculum Highlight

CDEV 41B Issues – Teacher Seminar

“Make, Create, Innovate”

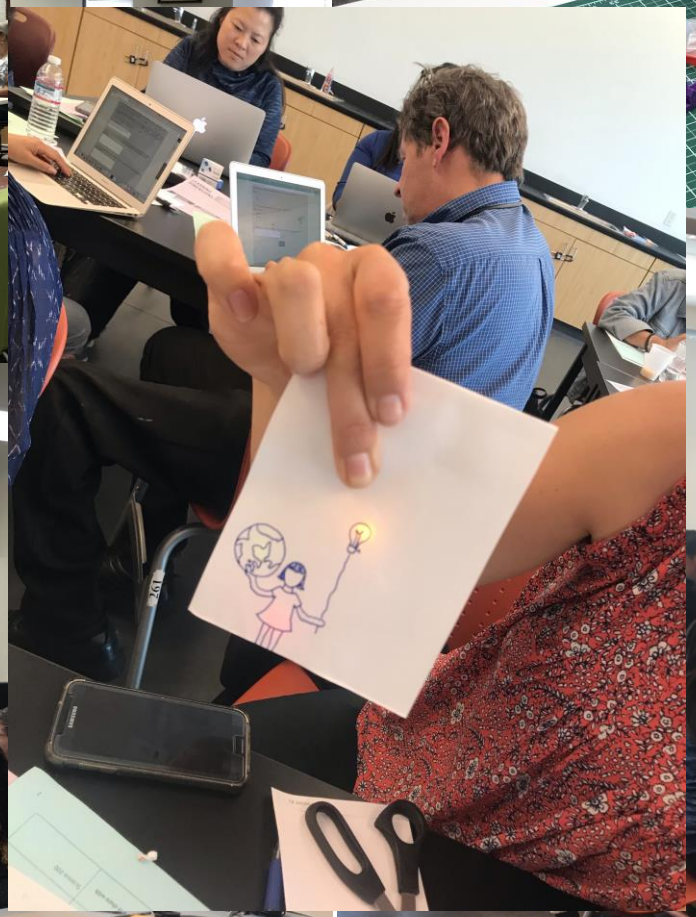
ChangeMakers Mini-Conference

June 2019

Saskia Leggett
@sleggss
4. You, as a teacher, are a designer and facilitator.
The environment you create is just as important as the content.
Photo: Wonderful Idea Co.
"Constructionism gives non-dominant youth power that they don't get to experience within systems that they're up against."
– Jaleesa Trapp, PhD Student, LLK
3. It's not about jobs, but not not about jobs.

Print Station
COLLABORATORY

THE
MAKER
MOVEMENT
MANIFESTO
MARK HATCH
CEO, TECHSHOP
Minecraft for Makers
Paper Inventions



CAUTION
EYE PROTECTION
MUST BE WORN
IN THIS AREA
FIRST AID
STATION

Why do you teach?

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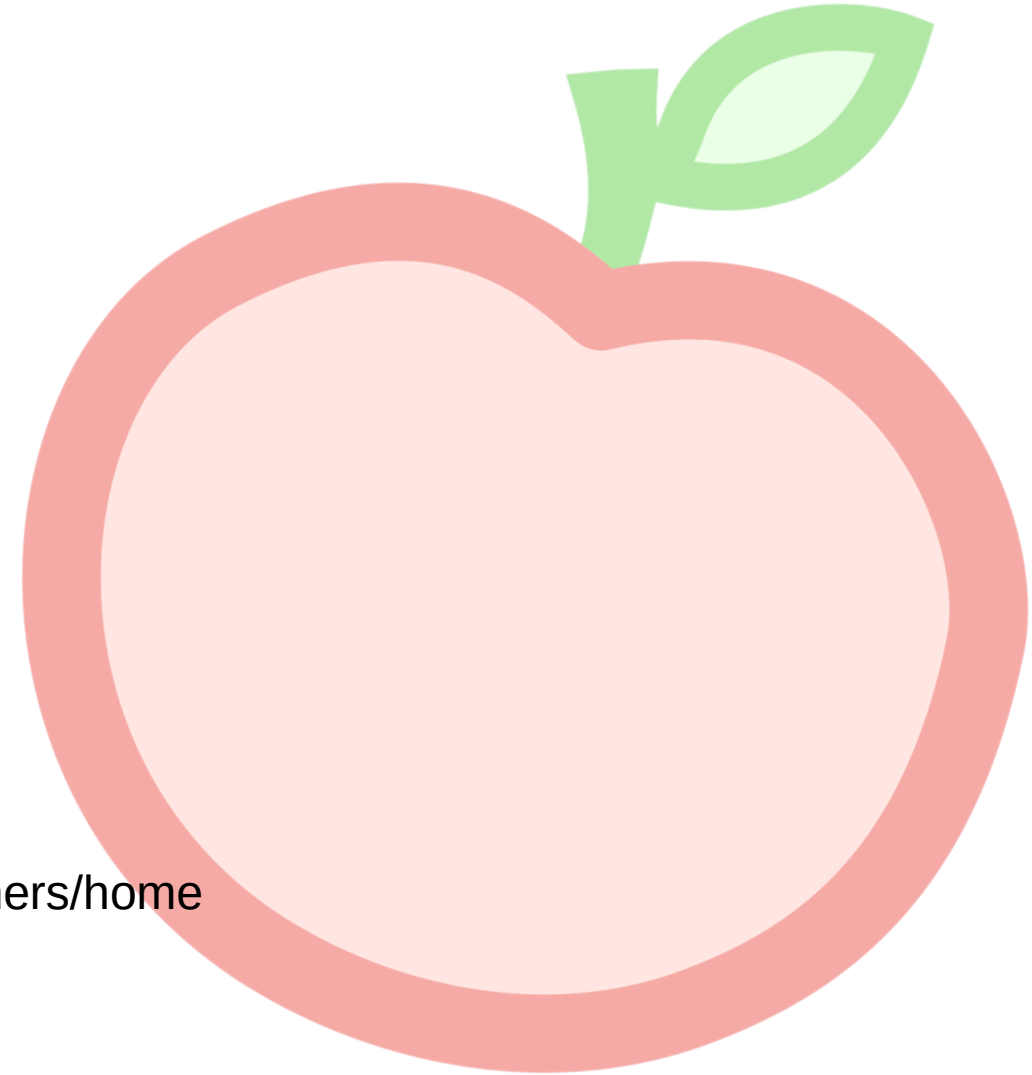
Project Resources

https://sites.google.com/mail.ccsf.edu/nextgenteachers/home