maker space:

Promoting Engagement of the California Community Colleges with the Maker Space Movement

BRIE LINDSEY, CCST
JUNE 13, 2016
BERKELEY, CA

InnovationMaker3 Symposium

STEM/STEAM SKILLS FOR THE CREATIVE ECONOMY

CCST
CALIFORNIA COUNCIL ON
SCIENCE & TECHNOLOGY

what is making?

Creating.
+
Communal
Interdisciplinary
STEM/STEAM-focused
Diverse
Process
Open-ended, inquiry-based
Fun and playful
Empowering

maker space

CCST
CALIFORNIA COUNCIL ON
SCIENCE & TECHNOLOGY

what can students learn?

Making & makerspaces are complementary

"4 C's" of 21st Century Skills:
Creative Thinking ❖ Critical Thinking ❖ Collaboration ❖ Communication

Soft Skills:
Problem solving ❖ oral & written communication ❖ teamwork/collaboration ❖ leadership ❖ creativity/innovation ❖ self-direction ❖ professionalism/work ethic

CCST
CALIFORNIA COUNCIL ON
SCIENCE & TECHNOLOGY

the robots are coming

21ˢᵗ Century Skills are increasingly important

CCST
CALIFORNIA COUNCIL ON
SCIENCE & TECHNOLOGY

making and WBL

Work-based learning programs:

- Improve completion rates
- Develop workplace skills (teamwork, creative problem solving)

- Increase student interest in potential career paths

STEM: life-long impacts
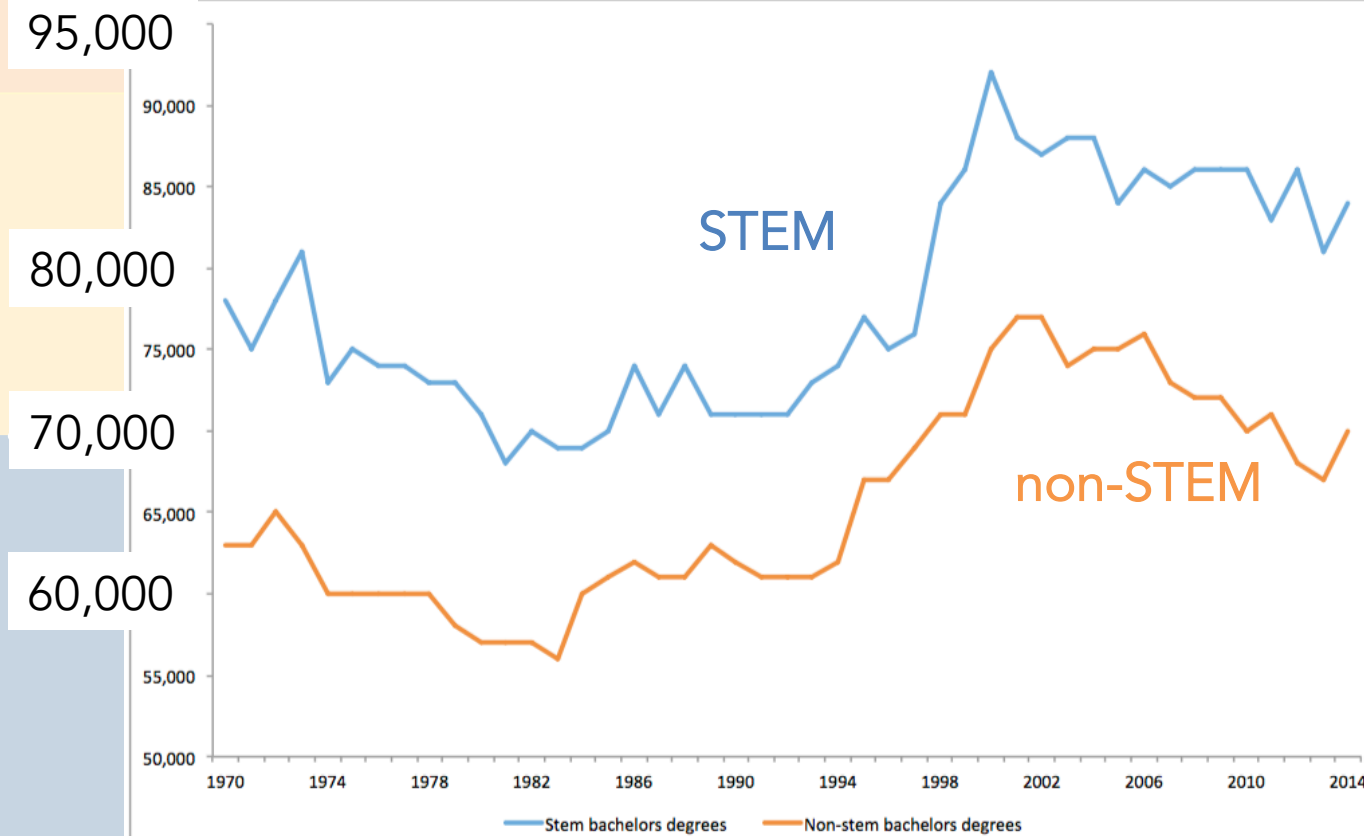
Mean earnings for STEM vs. non-STEM bachelor's degree holders from 1970 to 2014.
(Source: University Ventures Letters, Volume VI, #5. March 4, 2016.)

making strong ecosystems

Entrepreneurial Ecosystem

Accessible markets

Human capital / workforce

Funding & finance

Support systems / mentors

Government regulatory framework

Education & training

Major universities as catalysts

Cultural support

*

Ranked least prevalent pillar worldwide
(41%, 31% excl. US)

Cultural support
(tolerance of risk
and failure,
celebration of
innovation,
positive image of
entrepreneurship)

Technical support

Mentoring, training

Curr.-based learning

Culture of Respect

Risk Tolerance/Support

Etsy; Ebay

Kickstarter; Indiegogo

MAKER MINDSET

2013 World Economic Forum survey of 1,000 entrepreneurs: 8 pillars of entrepreneurial ecosystem

CCST
CALIFORNIA COUNCIL ON
SCIENCE & TECHNOLOGY

making assessments

Academic: P21 Framework

P21 Framework for 21st Century Learning

21st Century Student Outcomes and Support Systems

© 2007 Partnership for 21st Century Learning (P21)

www.P21.org/Framework
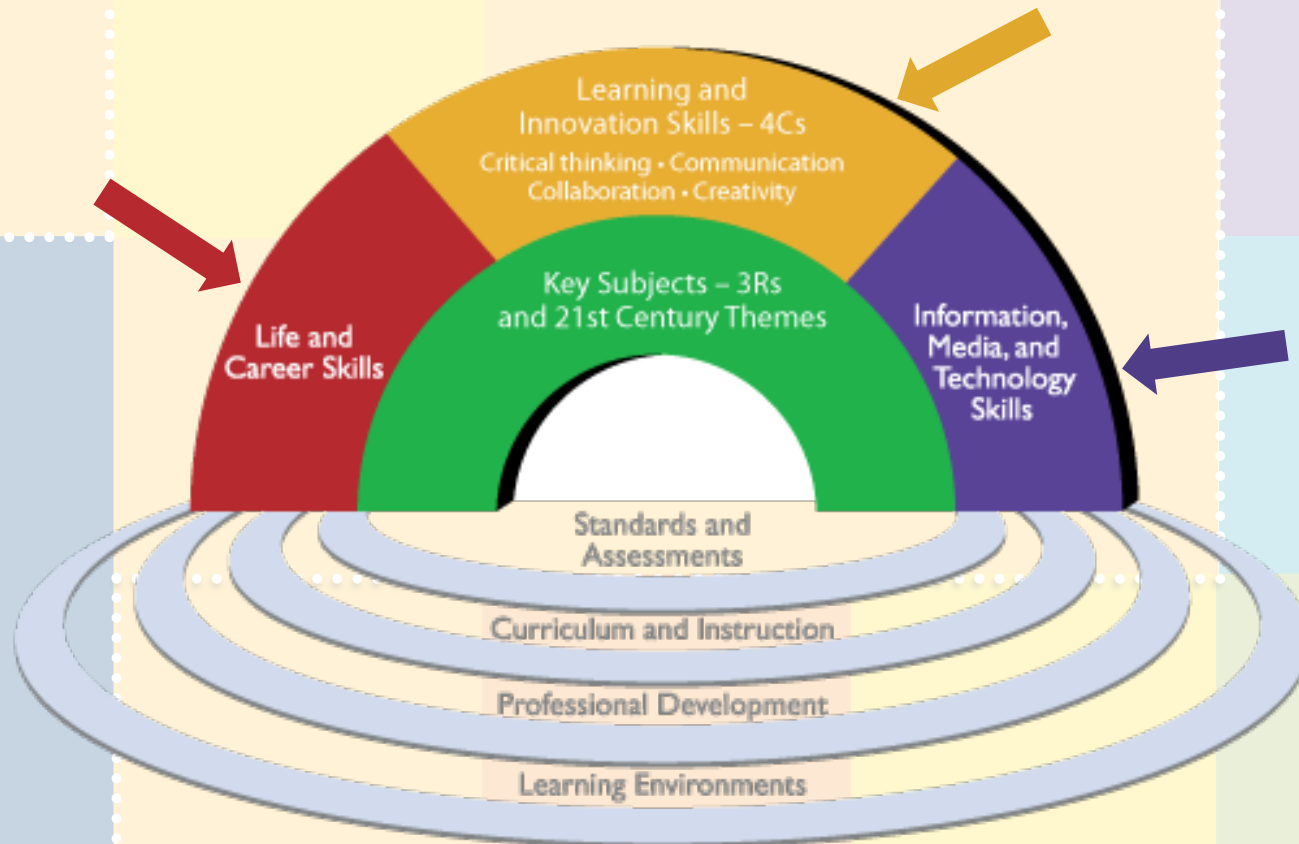
making assessments

Entrepreneurial:

Entrepreneurial Ecosystem Vibrancy—
Connectivity

(Strangler and Bell-Masterson, 2015)

Indicator	Measure	Possible Sources
CONNECTIVITY	Program connectivity	Under development
	Spinoff rate	Possibly: CrunchBase; LinkedIn
	Dealmaker networks	Private databases, including Capital IQ

Connections matter, and a dense network of connections, among a small number of programs, is arguably more important than a sparse network among a larger number.[16]

CCST
CALIFORNIA COUNCIL ON
SCIENCE & TECHNOLOGY

making considerations

- Statewide network of MakerSpaces
- Lead institution
- Geographically dispersed
- Connect CCs to regional economies
- Offer links to jobs, WBL

making considerations

- Strong support from CTE, STEM/STEAM
- Staff commitment
- Mutually beneficial interactions between MSs and traditional course offerings
- Integrate with traditional instruction framework
- Complement existing course offerings

CCST
CALIFORNIA COUNCIL ON
SCIENCE & TECHNOLOGY

how might the network look?

- TAP – responsible for growth and success
- Steering committee – draw from outside
  - CEOs from MSs outside network
  - Execs from businesses & foundations
  - Reps of key Maker orgs (Maker Media, Fab Lab)
- Regularly meet/share knowledge
  - Webinars (every other month, rotating topics)
  - Annual in-person meeting @/near Maker Faire

CCST
CALIFORNIA COUNCIL ON
SCIENCE & TECHNOLOGY

how might the network look?

- Sharing of staff resources
  - Pool buying power for equip/software
  - Pool staff time for grant applications/requests for donations

- Shared methodology for identifying how each MS will meet network's goals

CCST
CALIFORNIA COUNCIL ON
SCIENCE & TECHNOLOGY

start measuring success

Questionnaire-style:

- # of measurable products
- # workshops, badges, etc
- % completing a certificate program
- % transferring to 4-yr
- % obtaining related job
- Is MS receiving contributions from local bus & gov't?
- Do regional employers recognize and value badges, etc. earned at MS?

Behavioral Metrics:

Learning Dimensions Rubric framework (Exploratorium, 2015)

the tinkering studio | **Facilitation Field Guide** | **expl○ratorium**

Facilitation Goals	Practices	Techniques
Spark initial interest	◉ Welcome people and invite them to the space ◉ Introduce the activity and set the mood for the interaction	◉ Smile and introduce yourself ◉ Orient learners to the available tools and materials ◉ Offer a place to start working ◉ Meet them at eye level when explaining or modeling ◉ Show examples that demonstrate a variety of thinking ◉ Suggest a prompt that generates possibilities
Sustain participation by following the learner's ideas	◉ Value tentative ideas, "mistakes," and wrong directions ◉ Support their process in moments of failure and frustration	◉ Observe learners for a bit before jumping in ◉ Ask questions about their process ◉ Listen to their ideas ◉ Restate statements or questions ◉ Offer new materials or tools ◉ If you don't know the answer, work together ◉ Give learners suggestions instead of directions ◉ Show enthusiasm about their ideas
Deepen understanding through making connections	◉ Guide people to go a little bit further than they could on their own ◉ Surface connections between projects and links to outside learning experiences	◉ Encourage people to look around the space for inspiration ◉ Point out shared goals around the room ◉ Offer technical terms only when relevant ◉ Let participants explain their thoughts and define the next steps ◉ Encourage risk-taking and experimentation ◉ Offer challenges that allow learners to go further down their own path ◉ Discuss how the experience might relate to outside interests ◉ Celebrate moments of wonder, surprise, and joy

http://tinkering.exploratorium.edu/learning-and-facilitation-frameworks

CCST
CALIFORNIA COUNCIL ON
SCIENCE & TECHNOLOGY

funding + sustainability

- Revenue sources to consider:
  - Membership dues
  - School district funds
  - Foundations
  - Federal agencies
  - Local government
  - Business sponsors
  - For-credit courses
  - Classification as campus resource

CCST
CALIFORNIA COUNCIL ON
SCIENCE & TECHNOLOGY

start making

Startup checklist:

- ☐ Goals
- ☐ Activities
- ☐ Tools/Equipment
- ☐ Space/Infrastructure
- ☐ Staff
- ☐ Community and Campus Support
- ☐ Website and Database
- ☐ Funding Strategy

thank you!

Report Authors:
Laura Feinstein, M. Daniel DeCillis, Laurie Harris

Report Editors:
Susan Hackwood, Amber Mace, Van Ton-Quinlivan

Presented by:
Brie Lindsey
brie.lindsey@ccst.us

CCST
CALIFORNIA COUNCIL ON
SCIENCE & TECHNOLOGY

thank you!

Report Authors:

Laura Feinstein, M. Daniel DeCillis, Laurie Harris

Report Editors:

Susan Hackwood, Amber Mace, Van Ton-Quinlivan

Presented by:

Brie Lindsey

brie.lindsey@ccst.us

CCST
CALIFORNIA COUNCIL ON
SCIENCE & TECHNOLOGY

thank you!

Report Authors:
Laura Feinstein, M. Daniel DeCillis, Laurie Harris

Report Editors:
Susan Hackwood, Amber Mace, Van Ton-Quinlivan

Presented by:
Brie Lindsey
brie.lindsey@ccst.us

CCST
CALIFORNIA COUNCIL ON
SCIENCE & TECHNOLOGY

Exhibit 1-2 : Components of Entrepreneurial Ecosystem Pillars

Accessible markets

- Domestic market:
  - Large companies as customers
  - Small/medium-sized companies as customers
  - Governments as customers
- Foreign market:
  - Large companies as customers
  - Small/medium-sized companies as customers
  - Governments as customers

Funding & finance

- Friends and family
- Angel investors
- Private equity
- Venture capital
- Access to debt

Government & regulatory framework

- Ease of starting a business
- Tax incentives
- Business-friendly legislation/policies
- Access to basic infrastructure
- Access to telecommunications/broadband
- Access to transport

Major universities as catalysts

- Promoting a culture of respect for entrepreneurship
- Playing a key role in idea-formation for new companies
- Playing a key role in providing graduates for new companies

Human capital/workforce

- Management talent
- Technical talent
- Entrepreneurial company experience
- Outsourcing availability
- Access to immigrant workforce

Support systems/mentors

- Mentors/advisers
- Professional services
- Incubators/accelerators
- Network of entrepreneurial peers

Education & training

- Available workforce with pre-university education
- Available workforce with university education
- Entrepreneur-specific training

Cultural support

- Tolerance of risk and failure
- Preference for self-employment
- Success stories/role models
- Research culture
- Positive image of entrepreneurship
- Celebration of innovation

CCST
CALIFORNIA COUNCIL ON
SCIENCE & TECHNOLOGY