maker space:

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

BRIE LINDSEY, CCST
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BERKELEY, CA

STEM/STEAM SKILLS FOR THE CREATIVE ECONOMY
what is making?

Creating.

+ Communal

Interdisciplinary

STEM/STEAM-focused

Diverse

Process

Open-ended, inquiry-based

Fun and playful

Empowering

maker space
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
The robots are coming

21st Century Skills are increasingly important

Via MIT Technology Review:
Image courtesy of Simbe Robotics; image courtesy of Savioke; image courtesy of Knightstcope; image courtesy of Starship Technologies
making and WBL

Work-based learning programs:
- Improve completion rates
- Develop workplace skills (teamwork, creative problem solving)
- Increase student interest in potential career paths
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

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

- Technical Talent
- Mentoring, training
- Kickstarter, Indiegogo
- Curr.-based learning
- Etsy, Ebay
- Risk Tolerance/Support
- Culture of Respect
- Celebration of innovation
- Positive image of entrepreneurship

Maker Mindset

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

Academic: P21 Framework

P21 Framework for 21st Century Learning
21st Century Student Outcomes and Support Systems

- Learning and Innovation Skills – 4Cs
  - Critical thinking
  - Communication
  - Collaboration
  - Creativity

- Key Subjects – 3Rs and 21st Century Themes

- Information, Media, and Technology Skills

- Life and Career Skills

- Standards and Assessments

- Curriculum and Instruction

- Professional Development

- Learning Environments

© 2007 Partnership for 21st Century Learning (P21)
making assessments

Entrepreneurial: Entrepreneurial Ecosystem Vibrancy—Connectivity (Strangler and Bell-Masterson, 2015)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Measure</th>
<th>Possible Sources</th>
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<tbody>
<tr>
<td></td>
<td>Program connectivity</td>
<td>Under development</td>
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<td></td>
<td>Spinoff rate</td>
<td>Possibly: CrunchBase; LinkedIn</td>
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<td></td>
<td>Dealmaker networks</td>
<td>Private databases, including Capital IQ</td>
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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.\(^{16}\)
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
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
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
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)

http://tinkering.exploratorium.edu/learning-and-facilitation-frameworks
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
### 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:
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### Exhibit 1-2: Components of Entrepreneurial Ecosystem Pillars

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<th>Accessible markets</th>
<th>Human capital/workforce</th>
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<td>- Domestic market:</td>
<td>- Management talent</td>
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<tr>
<td>- Large companies as customers</td>
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<td>- Small/medium-sized companies as customers</td>
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<tr>
<td>Funding &amp; finance</td>
<td>- Entrepreneurial company experience</td>
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<tr>
<td>- Friends and family</td>
<td>- Outsourcing availability</td>
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<tr>
<td>- Angel investors</td>
<td>- Access to immigrant workforce</td>
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<tr>
<td>- Private equity</td>
<td>Support systems/mentors</td>
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<tr>
<td>- Venture capital</td>
<td>- Mentors/advisers</td>
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<tr>
<td>- Access to debt</td>
<td>- Professional services</td>
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<tr>
<td>Government &amp; regulatory framework</td>
<td>- Incubators/accelerators</td>
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<tr>
<td>- Ease of starting a business</td>
<td>- Network of entrepreneurial peers</td>
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<tr>
<td>- Tax incentives</td>
<td>Education &amp; training</td>
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<tr>
<td>- Business-friendly legislation/policies</td>
<td>- Available workforce with pre-university education</td>
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<tr>
<td>- Access to basic infrastructure</td>
<td>- Available workforce with university education</td>
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<td>- Access to telecommunications/broadband</td>
<td>- Entrepreneur-specific training</td>
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<td>- Access to transport</td>
<td>Cultural support</td>
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<tr>
<td>Major universities as catalysts</td>
<td>- Tolerance of risk and failure</td>
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<td>- Promoting a culture of respect for entrepreneurship</td>
<td>- Preference for self-employment</td>
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<tr>
<td>- Playing a key role in idea-formation for new companies</td>
<td>- Success stories/role models</td>
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<tr>
<td>- Playing a key role in providing graduates for new companies</td>
<td>- Research culture</td>
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<td>Cultural support</td>
<td>- Positive image of entrepreneurship</td>
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