MAKING CULTURE
A National Study of Education Makerspaces

Questions: slido.com @radio_kah_reem
#MakingCulture @youngmoo
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MAKING CULTURE

I. Making as a Culture of Learning: Report on education makerspaces

II. The Culture of Making: Equity in makerspaces

III. Making through Cultural Inclusion
Ethnography of Making

Our study investigated the cultures of teaching and learning practices facilitated through makerspaces.

Our goal was to develop a more comprehensive understanding of maker culture as a potential driver for education innovation.

30 site visits to makerspaces across the U.S.
Site Locations

- East Palo Alto
- Seattle
- Portland
- Honolulu
- San Antonio
- Austin
- Washington, DC
- Newark, NJ
- Pittsburgh
- Madison-Chicago
- Philadelphia
- New York
- New York
Research Methods

Linguistic coding shaped our analysis and evaluation

- 80 interviews based on 20 loosely-structured questions
- 4,600 coded instances
- 60 distinct codes (3 coding levels)
Finding 1: Equity & Inclusion
Impact on Participation

Adult Leadership Across Makerspaces

Total Leadership
- Male
- Female

Formal
- Male
- Female

Informal
- Male
- Female
### Implicit Bias

<table>
<thead>
<tr>
<th>Activity</th>
<th>Male Students</th>
<th>Female Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geeks</td>
<td>20</td>
<td>“Girls” 92</td>
</tr>
<tr>
<td>Builders</td>
<td>18</td>
<td>Helpers 11</td>
</tr>
<tr>
<td>Designers</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Engineers</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>“Boys”</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
Impact on Participation

Student Participation in Makerspaces (%)

K-8th Gr.

9th-12th Gr.

Male
Female
Finding 2: Makerspace Culture & the “Maker Mindset”
## Showcase vs. Competitions

<table>
<thead>
<tr>
<th>In reference to showcase (e.g., Maker Faires)</th>
<th>In reference to competitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers</td>
<td></td>
</tr>
<tr>
<td>Learning</td>
<td>Opportunity</td>
</tr>
<tr>
<td>Growth</td>
<td>Drive</td>
</tr>
<tr>
<td>Sharing</td>
<td>School Pride</td>
</tr>
<tr>
<td>Relaxed</td>
<td>Winning</td>
</tr>
<tr>
<td>Students</td>
<td></td>
</tr>
<tr>
<td>Sharing</td>
<td>Preparation</td>
</tr>
<tr>
<td>Open</td>
<td>Leadership</td>
</tr>
</tbody>
</table>
### Unstructured Open Hours and the “Maker Mindset”

<table>
<thead>
<tr>
<th>Teacher referenced...</th>
<th>Student referenced...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inquiry</td>
<td>Exploration</td>
</tr>
<tr>
<td>Note Taking</td>
<td>Risk</td>
</tr>
<tr>
<td>Technical Reading</td>
<td>Peer Sharing</td>
</tr>
</tbody>
</table>

More students introduced to the makerspace
Finding 3: Making Community
# Sharing with Different Communities

<table>
<thead>
<tr>
<th></th>
<th>Institutional</th>
<th>Regional</th>
<th>Distance/Global</th>
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</thead>
<tbody>
<tr>
<td><strong>Artisinal</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fabrics</td>
<td>9</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Fine Arts</td>
<td>5</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Agriculture</td>
<td>11</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td><strong>Technological</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robotics</td>
<td>3</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Game Design</td>
<td>2</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>Lego Mindstorms</td>
<td>0</td>
<td>0</td>
<td>16</td>
</tr>
</tbody>
</table>
MAKING CULTURE
Summarizing the key recommendations from the National Survey of K-12 Education Makerspaces

1. Start with Culture
Focus first on the culture of your space, which is the foundation for sustained student learning.

2. Recruit Inclusively
Avoid exclusionary language and imagery when recruiting instructors and students.

3. Beware of Bias
Beware implicit biases (gender and others) in language and instruction.

4. Decide Directions
Make intentional program choices for different outcomes. There is not just one kind of makerspace.

5. Target and Engage
Target projects that improve your organization. Find opportunities to engage with the local community.

6. Open Hours
Maximize open hours for your makerspace. Open hours give students agency and present a more inclusive and welcoming environment.

7. Share Knowledge
Foster sharing of knowledge with a broader community. A culture of sharing can lead to new learning opportunities and external, real world projects.

bit.ly/makingculture
II. The Culture of Making: *Equity in makerspaces*

*Questions: slido.com @radio_kah_reem #MakingCulture @youngmoo*
“Every Child a Maker”
MakerEd

• Based on our study, we fear the traditional Maker identity, in its current form, is not inclusive.

• Although Making espouses inclusivity and openness in both design and environment, the predominant culture remains that of white masculinity.
“So, the space itself, it’s not about the tools that you have, but it's all about this, it is an equity issue... And just because you put in the Makerspace in that school doesn’t mean that’s going to change culture of that school.”

- K-12 Principal
“[Make] magazine is the face of the movement, and as face of movement, it has a responsibility to be more egalitarian and more diverse. The problem is that this may not be a successful business strategy. Customers of Make are basically rich white guys; this is a great foundation to build a business on but not a great foundation for a social movement.”

Leah Buechley, August 20, 2014
No black person has ever been on the cover of MAKE magazine
Makerspace Leadership
Demographics by race

- White: 79%
- Mixed: 5%
- Latinx: 3%
- Pacific Islander: 5%
- Black: 8%
What I love about this space, being a **Black male and leader**... I'm able to have control over the curriculum... If we can give our **minority students** access and the exposure before they get there, they can start coding in high school, and they can be exposed ... They can put these skills in their resume.

- K-12 Teacher
Cultural Context

• The promise of making and maker culture is access to economic forces that will empower.

• Race in our society impacts us all both on a societal and individual level. Race is a strong predictor of opportunity in the United States.

• A student’s race largely determines quality of access to health and education resources... Why would we think it's any different in the Maker movement?
Theoretical Foundation

• Culturally Responsive Teaching (CRT, Geneva Gay, Carol D. Lee, Gloria Ladson Billings):

• CRT teaches students to know and praise their own and each others’ cultural heritages.

• CRT incorporates multicultural information, resources, and materials in all the subjects and skills routinely taught in schools
“So I do see this as an opportunity for our Latin and African American girls to be creative. At the end, we have a Makerspace Showcase where they are able to talk about what they did.”

- Makerspace instructor
“I try to be organic. Many of these kids come from places and communities that have traditional making. I don't force any ideas. I try to make the space for them, so they pretty much control, most of the time, what they're making. I don't try to push on any ideas unless they're in a class setting when we make together.”

- K-12 Teacher
Cultural Framing

• STEM and makerspaces often create micro-aggressive environments, reinforcing an unequal power dynamic in the community.

• Race-neutral STEM approaches tend to contribute to racial disparity.

• The most marginalized groups, people of color and non-male gender, are not able to equally participate in and lead making activities.
Makerspaces are not prevalent in urban communities.

• Particularly in low-income schools where the focus is on test scores.

Urban schools don’t inspire much confidence these days. Politicians and policy leaders routinely bemoan their quality. And media outlets regularly run stories of “failing urban schools.”
“So, it's hard to talk about empowerment, right? It’s hard to explain to somebody, because it is not on a standardized test that, you know... I got a picture of a 6th grader in a tutu on a chop saw, you can't ever take that away from that child. Again, you can't ever stop them from being a creator once you teach them how to do it.”

- K-12 Principal
A problem in the “Making”

- Many spaces are dominated by projects and programs that reflect the interests of white male tech culture (robots, vehicles), which appeal to some students, but can exclude others.

- Makerspace leadership does not reflect the diversity of the country.

- Urban, under-resourced schools face particular challenges in developing makerspaces: lack of culturally relevant programs and onerous testing / performance tracking requirements.
Position

• Cultural responsiveness and inclusion should be the foundation of designing making spaces, projects, and challenges.

• The activities of making need to be disentangled from traditional maker (tech) culture and inclusive for non-dominant youth cultures.

• Aligning makerspace activities with community development and empowerment offers a path to greater cultural inclusion.

• The facilitators of makerspaces must reflect a diverse community (gender, race, ethnicity, SES, and more) and directly address inequalities and power dynamics in such spaces with all students.
Start with Culture

Focus first on the culture of your space, which is the foundation for sustained student learning.
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III. Making through Cultural Inclusion

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WEST PHILLY PROMISE NEIGHBORHOOD
Center/West Philly (Google Maps)
Goal: Inclusive Making

- Create and develop a culturally inclusive and authentic makerspace to address the shortcomings revealed in our research.

- Serve as a regional educational research and design venue for student and teacher learning and pedagogical model/showcase for emerging maker methods and practices.

- Continue to engage in gender, racial and income equity work to bridge long-standing achievement gaps locally in both STEM and Arts.
Young Dragons
Summer STEAM Program
CULTURALLY SUSTAINING PEDAGOGIES

The project aims to engage youth from groups underrepresented in STEM by producing a model that emphasizes the ubiquity of computing and computational making practices that already exist in young people’s lives and expands these practices.
BLACK GIRLS STEAMING THROUGH DANCE

A Transdisciplinary Collaborative Project

Ayana Allen-Handy, Valerie Ifill, Michelle Rogers, and Raja Schaar | STEAM Education Workshop | February 18, 2019
Made in West Philly
May 18, 2019
Dornsife Center for Community Partnerships
Drexel University
TransCEND

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