

### THE MAKER MOVEMENT AND HIGHER EDUCATION

The Maker Movement has become increasingly visible over the last decade—visible everywhere from small community clubs to the White House Lawn. As more educators become interested in the Maker Movement, California's institutes of higher education have embraced making as a way to more deeply engage a diverse range of students with STEM fields and to develop 21st century skills for future jobs.

#### SO, WHAT IS... ?

- **The Maker Movement:** A growing collection of people who embrace the “do-it-yourself” ethos. Increasingly affordable, rapid-prototyping tools and technologies—such as 3D printing—and the establishment of local and online communities of practice are contributing to the movement's expansion.
- **Making:** A class of activities focused on designing, modifying, or repurposing material or digital objects, for playful or practical ends, with the end goal of producing a shareable artifact.
- **A Makerspace:** A community workspace where people come together to create. Makerspaces may focus on fields such as robotics, woodworking, sewing, programming, or any combination of these and other skills. In the context of higher education, these can be found on- or off-campus, open to students only or to the entire community. College and university makerspaces may encourage participation from hobbyists and entrepreneurs alike.
- **The Maker Mindset:** The belief that the skills required to create a desired object can be developed, improved, or expanded as necessary. Characteristics include problem solving, critical thinking, inquiry, collaboration, curiosity, playfulness, responsibility, risk-taking, and optimism. Developing this mindset is increasingly the focus of maker-based education.

#### TRENDS IN HIGHER EDUCATION MAKERSPACES

- Four-year universities across the United States are investing in makerspaces for their students. These spaces are often—though not always—connected with the campus' engineering departments. In 2016, in response to President Obama's call to give all Americans the opportunity to make, 77 colleges and universities across 32 states pledged to increase their commitment to making.
- As the Maker Movement expands in K-12 education, more high school students are familiar with makerspaces and look to continue their maker education in college—makerspaces can therefore be used to recruit.
- A growing number of higher education institutes across the country are planning to accept maker portfolios as supplemental application materials. Carnegie Mellon, MIT, and others have already been accepting them for several years. In addition, a number of colleges are planning to offer scholarships to students who demonstrate excellence in making, including California College of the Arts, Folsom Lake College, and Sierra College.

#### EXAMPLES IN CALIFORNIA:

- **University of California, Berkeley:** One of California's premier engineering institutions, UC Berkeley has multiple makerspaces, including the recently opened Jacobs Institute for Design Innovation, a 24,000 square foot makerspace on campus, which functions as the university's interdisciplinary hub for learning and making at the intersection of design and technology. Many courses offered through the Jacobs Institute are designed by faculty from across campus and focus on confronting problems with societal impacts.
- **California State University, Sonoma:** The CSUs are working to have a makerspace on every CSU campus, targeting libraries as the location for those campuses that don't already have a makerspace. Library makerspaces have different benefits and challenges compared with, for instance, a building erected specifically to house a makerspace. Sonoma State University has pioneered a Maker Educator certificate and is attempting to expand that program to more CSU campuses to enable K-12 maker educators to learn the skills they need to bring maker education to their students.
- **California Community Colleges:** The CCCs are in the middle of a three-year project, the CCC Maker Initiative, envisioned by the California Community Colleges Chancellor's Office (CCCCO), Workforce and Economic Division, under the Doing What Matters framework. Last year, 24 community colleges were awarded funding to create a statewide network of makerspaces. Ultimately, the project is aimed at creating a college maker culture that will prepare students with 21st century skills, fuel job creation, and strengthen regional economies.



#### EXPERT PANELISTS

##### CARLOS AYALA, PHD

Dean, School of Education  
Professor, Dept. of Curriculum Studies  
and Secondary Education  
Sonoma State University  
[dean.education@sonoma.edu](mailto:dean.education@sonoma.edu)  
707-664-2132

*Expertise: the drive to establish makerspaces at all CSUs; the importance of making to education; the Maker Educator certificate.*

##### BJÖRN HARTMANN, PHD

Associate Professor, Faculty Director  
Jacobs Institute for Design Innovation,  
UC Berkeley, Electrical Engineering and  
Computer Sciences  
[bjorn@eecs.berkeley.edu](mailto:bjorn@eecs.berkeley.edu)  
415-868-5720

*Expertise: Maker Movement in higher ed. at a national scale; using makerspaces for interdisciplinary studies to answer big questions.*

##### CAROL PEPPER-KITTREDGE

Associate Dean, Workforce Innovation;  
Statewide Project Director, CCC Maker  
Initiative, Sierra College  
[cpepper-kittredge@sierracollege.edu](mailto:cpepper-kittredge@sierracollege.edu)  
916-660-7801

*Expertise: the implementation and progress of the CCC Maker Initiative and its emerging statewide network.*

##### JEREMY QUALLS, PHD

Professor, Dept. of Physics & Astronomy;  
Director of Academic Planning &  
Resources, School of Sci. & Technology,  
Sonoma State University  
[quallsj@sonoma.edu](mailto:quallsj@sonoma.edu)  
707-484-9269

*Expertise: differences between college-level and K-12 makerspaces; the initiative to establish makerspaces at all CSUs; how he measures the impact of makerspaces on students.*

##### VAN TON-QUINLIVAN

Vice Chancellor for Workforce and Digital  
Futures, CCCCCO  
[vtquinlivan@ccccc.edu](mailto:vtquinlivan@ccccc.edu)  
916-327-5492

*Expertise: why the CCC's are engaging in the Maker Movement and how she started the project that is leading to the statewide network.*

