Synthesis and Design Workshop: Principles for the equitable design of digitally-distributed, studio-based, STEM learning environments

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Purpose

**Studio-Based Learning Environments**  
(makerspaces, co-working spaces, innovation labs, fablabs)

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**Access, Equity & Inclusion**  
(Ways and means of carrying out inquiry through making contexts, cultures, and practices)

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**Digital/Virtual Learning Opportunities**  
(collaboration among participants, experts, community members, facilitators, and learning guides/mentors, facilitating bi-directional expertise)

Paving the way forward for **sustained efforts** that span **research & practice** communities
Participants & Location

Total Number of Participants = 63

Biosphere 2 February 25-28, 2019

Iconic setting for formal and informal collaboration. Location was a key feature that served to excite participants about state-of-the-art research, and create connections to the scientific community.
Process

Interactive Online Meetings

Online Community Spaces for Sharing Ideas

Networking & Community Building

5 Strand Discussions

Provocation Talks

State of the Landscape Panel

Gallery Walk Reflections

Pitch to the Community Near-term Long-term Priorities

Synthesis and White Paper

Biosphere 2: A Place of Inspiration and Innovation

Scavenger Hunt, Meal-time Conversations, Casita Time, Maker Night, Field Trips
Equitable practices create inclusive environments.
Findings

Learning Environment
- Learner Equity
- Spaces and their evolution
- Re-appropriate resources

Community
- Nurture Creative Communities of Practice
- Values, Cultures and Belonging
- Inquiry and Curiosity

Capturing Learning
- Learner interactions
- Instructional Routines
- Longitudinal Data

Pedagogy & Scaffolding
- Culturally Sustaining teaching and learning strategies
- Studio-based learning practices of critique and cooperation

Digital Tools & Mediation
- Contextual and Specific to Space and Users
- Designing for Change
- STEM and STEAM/Arts
Principles

Critical, Creative, Collaborative Inquiry

Interest-driven Learning

Transportable Skills
- Shared Purpose
- Creation Centered
- Academically Oriented

Practices Travel Across Contexts
Knowledge travels across contexts
Principles

**Inclusive**
- draw from multiple perspectives, expertise areas, shared knowledge, and experiences to eliminate barriers and broaden access

**Intersectional**
- work collaboratively across communities where learners come together to support mutually reinforcing knowledge and practices

**Innovative**
- use multiple technologies for learning, making, sharing, and exchanging ideas flexibly and creatively

**Responsive**
- plan forward for the evolution of spaces in response to community needs

**Transformative**
- create purposes for learning that provoke and respond to changing times

Exploration with technologies and hands-on materials; expand problem-solving to address real-world problems
Practice “generous exclusion” that celebrates values of space instead of open inclusion that dilutes values (Melo, 2019).
Recommendations

Near Term 3-5 Years
- Establish an Equity in Making Research Collaborative Network
- Create/disseminate processes for capturing learning to examine longitudinal data
- Connect research and practitioner voices to establish shared priorities

Longer Term 10+ Years
- Longitudinal Data Case Studies
- Learning Theories and Models
- Track what features/elements act as agents of change
- Data to illustrate transitions in the learning ecosystems as they evolve
- Expand implementation of different forms of digitally-distributed learning
Thank you!

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We welcome continued conversations, connections and partnerships to push this work forward.