



## STELAR Webinar Series

### Partnerships and Broadening Participation

Tuesday, May 14, 2-3 pm ET



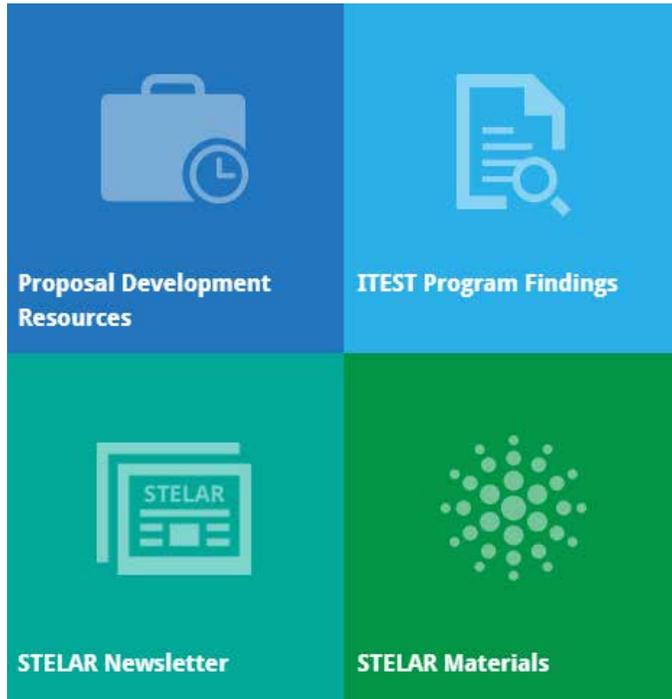
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# About STELAR:

- [STELAR: STEM Learning & Research Center \(STELAR\)](#)
- Resource Center for the NSF ITEST Program
- Located within [Education Development Center](#) in Waltham, MA
- EDC has supported the ITEST program since 2003



# What STELAR does:



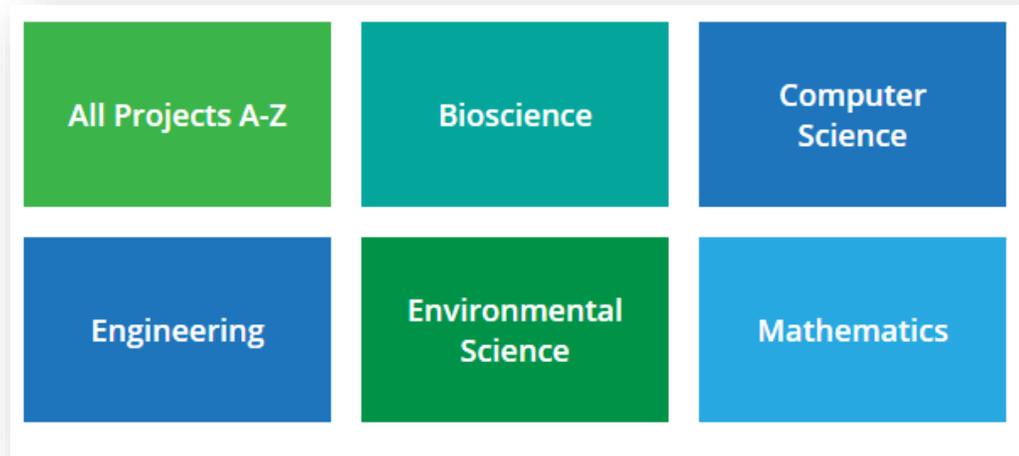
- **Technical support** the ITEST community
- **Disseminate** ITEST project findings nationally
- **Broadening participation** in the ITEST portfolio
- **Assisting** those interested in submitting an ITEST proposal

# Resources:

## Developing a Proposal

- + GET TO KNOW ITEST
- + PREPARE YOUR PROPOSAL FOR SUBMISSION
- + DEVELOP A ROBUST RESEARCH DESIGN
- + CREATE AN EFFECTIVE EVALUATION STRATEGY
- + CONNECT WITH PARTNERS
- + REACH UNDERSERVED POPULATIONS
- + DEVELOP THE WORKFORCE OF THE FUTURE

## Project Profiles



## Resource Library



# NSF's ITEST Program

- [Innovative Technology Experiences for Students and Teachers \(ITEST\) Program](#)
- Supports the research and development of innovative models for engaging PreK-12 students in STEM learning
- Builds students interest in and capacity to participate in the STEM and information and communications technology (ICT) workforce of the future
- Current solicitation is under revision  
**Full Proposal Deadline Date: August 14, 2019**





# NSF EAGER Maker Summit

Dec 10 - 11, 2018 | Alexandria, VA

## Event Overview

Charting the Future of Making in STEM Education



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# NSF EAGER Maker Projects

NSF 15-086

## Dear Colleague Letter: Enabling the Future of Making to Catalyze New Approaches in STEM Learning and Innovation

June 4, 2015

Dear Colleagues:

The National Science Foundation (NSF) has contributed substantially to the development of the US *Maker Movement* and the exploration of *Making* as a pathway to innovations and learning in science, technology, engineering and mathematics (STEM). NSF's [strategic fundamental research investments](#) enabled many of the innovations underlying 3-D printing, computer-aided design, geometric modeling and computer-integrated systems. NSF has made a series of investments in the systematic discovery of new knowledge about [learning through Making](#) in diverse [formal and informal](#) settings including [fab lab classrooms](#), [television and interactive web media](#), [undergraduate engineering](#), and the first-ever *World Maker Faire*.

Today, a growing number of people engage in STEM practices and learning through various forms of *Making*. The *Maker* approach encourages people to understand how things work, to experiment, invent and redesign things through multiple iterations, to democratize and understand processes of engineering, science, and innovation, and to commercialize new products by developing and testing prototypes quickly and in a cost-effective manner. *Making* frequently takes place in social contexts, often called *Maker spaces*, where collaborators, mentors, advisors, and others can be found. These emerging ideas are pointing the way to how the STEM research and education community can both benefit from and contribute to the *Maker Movement*, improving U.S. innovation and STEM workforce development.



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# EAGER Maker Summit Goals

- Capturing current issues in the Maker movement with respect to education
- Identifying important research issues and trends
- Discussing NSF's investments in the Maker movement
- Recommending future directions for NSF research and development



# Summit working groups

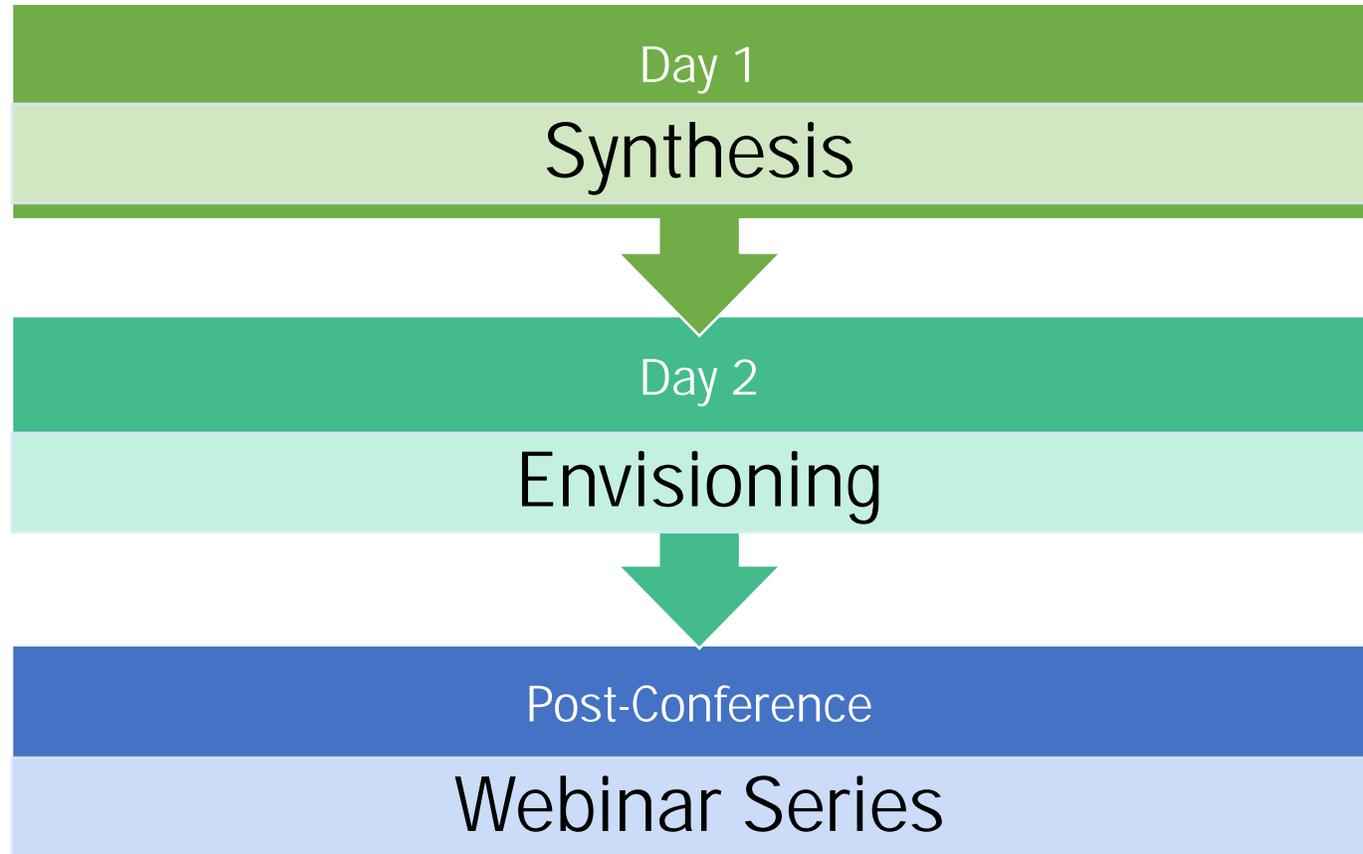
- Broadening Participation
- Partnerships
- Process and Pedagogy
- Research and Evaluation
- Workforce Development

## Discussion topics:

- Innovations
- Impacts
- Challenges
- Future of Making



# Structure of the Summit



# Today's presentations:

- **Bradley Barker & Dagen Valentine**  
**University of Nebraska-Lincoln**
  
- **Dorothy Jones-Davis**  
**Nation of Makers**





# NSF EAGER Maker Summit

*Charting the Future of Making in STEM Education*

## Partnerships



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# Nebraska innovation Maker Co-laboratory

Dagen Valentine

4-H/Extension Educator

University of Nebraska-Lincoln, United States



DRL #723520



*Knowinnovation*



UNIVERSITY OF  
**Nebraska**  
Omaha



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# NIMC Project Nebraska Innovation Maker Co-laboratory

- Establish Makerspace in rural community, Sidney, NE

- Population 7,000
- Community Support
  - § Sidney Create!
  - § Public Library
  - § Public School

- Collaboration Tools

- Existing Solutions
- Virtual Reality
- Telepresence Robotics



Sidney Makerspace  
at Sidney Public Library

- 3D printer
- Laser Cutter
- CNC
- Vinyl Cutter
- VR systems
- Digital SLR Camera
- Related Software
- Mic & Keyboard
- Telepresence robot



# Virtual Reality and Telepresence



Oculus Rift + Touch Controllers



Beam Telepresence robot by Suitable Tech

# Telepresence –Tinker Tuesday



# Virtual Reality

Collaboration, teaching, and design



Apps that support

– collaboration  
(multi-user)

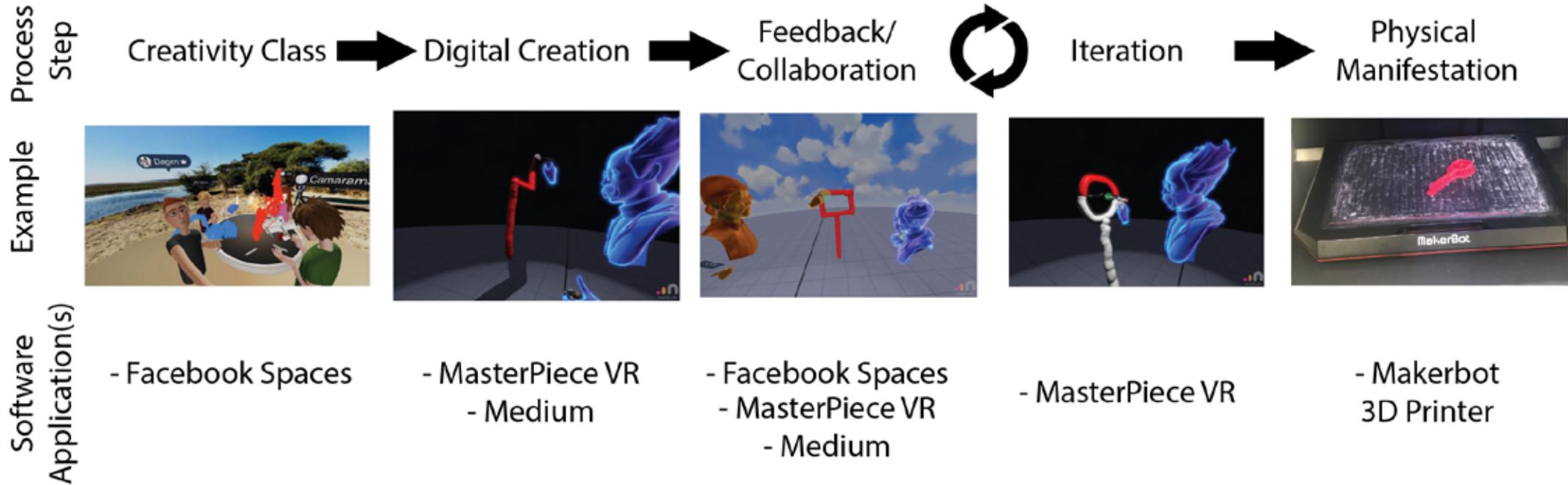
– design

– export designs

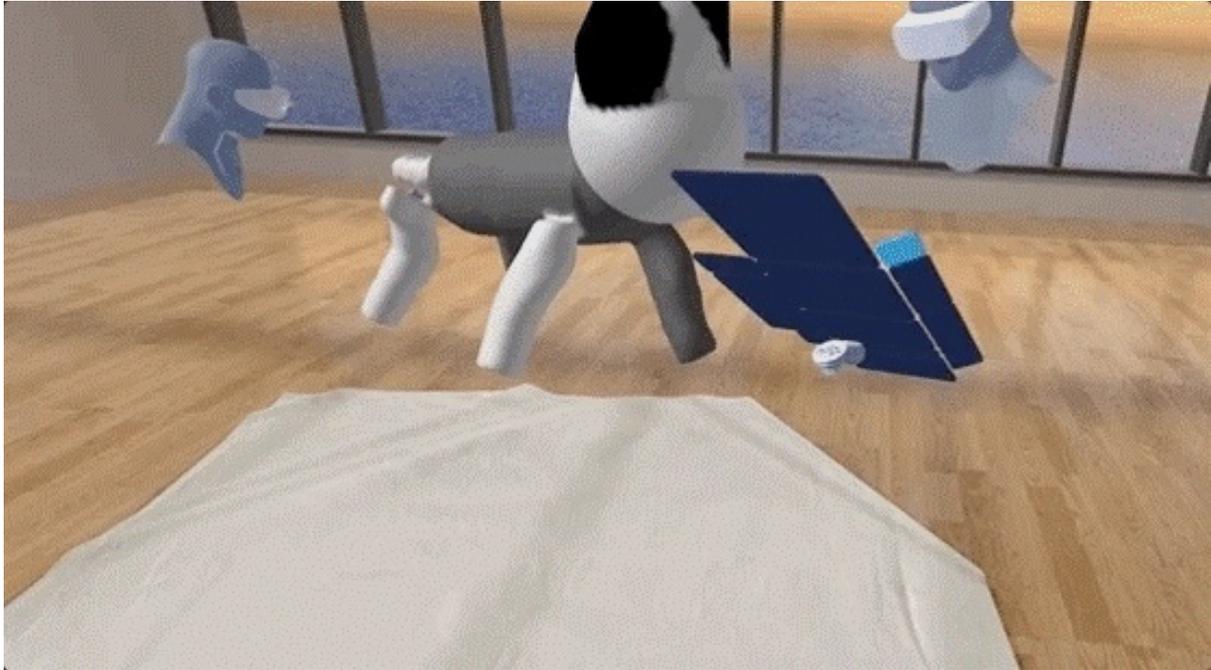


# Virtual Reality – Digital Creation Process

Digital Creation in VR to Physical Manifestation Process



# VR - Collaboration



Co-sculpting in Masterpiece VR



Discussing Design in FB Spaces

# Partners

## Local

- Sidney Create (local community org)
- Sidney Public Library
- Cheyenne & Platte County Extension
- Columbus & Sidney High Schools

## State and National

- Knowinnovation
- University of Nebraska Omaha
- Nebraska Library Commision



## Day 1 – Synthesis: The State of Making

- Explore the innovations and challenges that currently exist in Making projects focused on workforce development
- Share dreams and aspirations for the future of making

## Day 2 – Envisioning: Call to Action

- How do we get from where we are now to where we want to go?
- How can NSF support Making projects in working towards these goals?
- Identify gaps in the current body of research



# Synthesis: Challenges

- Relationship building takes time and work
- Recognition, across stakeholders/partners (e.g., academia, employers), of the 'value' of making
- Capacity building and buy-in within communities is needed to sustain efforts (beyond grants)
- Need for partnerships approaches that will:
  - Address learning and making 'deserts' that exist in both urban and rural communities due to lack of mentors, resources, community engagement, etc.
  - Improve training of both formal and informal practitioners



# Synthesis: Innovations

- Understand unique community needs and respond to them
- Connecting formal and informal learning and stakeholders
- Leveraging the talents of the community
- Employ research-practice partnerships
- Share successful partnership strategies (models and processes)



# The Future of Making

- Conduct research and evaluation on partnership strategies/approaches
- Fund partnership capacity building efforts in the field (e.g., look to collaboratory style approaches, the Stanford Innovation Review)
- Leverage existing resources and infrastructure (e.g., public libraries as partners and extension networks) to build buy-in and create avenues for sustainability
- Consider (non-traditional) partners and partnership approaches that intentionally broaden participation and disrupt barriers to access to Making in specific communities (e.g., rural and urban communities of low SES)



# Envisioning: The Path Forward

- Grants, sustainability, dissemination
- Resources and research on partnerships
- Centers like Nation of Makers or STELAR broker partner connections
- Supplemental funding for partnership capacity building efforts before diving in deep (in a smaller way before the funding starts or before getting a grant)
- Different sizes and scale of Maker Spaces of different sizes (a little place can do a lot with \$5K – so think about microgrants)





# NSF EAGER Maker Summit

*Charting the Future of Making in STEM Education*

## Broadening Participation



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## Day 1 – Synthesis: The State of Making

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# Synthesis: Challenges

## Perception and Identity

- Perception of making as cis, white, male
- Diverse makers may not consider themselves makers
- Intersectionality



# Synthesis: Challenges

## Designing with context in mind

- Access and equity are not the same thing
- Rural vs. Urban
- Cultural practices vary, are regionally specific, and are dynamic

## Emphasis

- Designing *with* particular communities



# Synthesis: Challenges

## The impact of power dynamics and the nature of being an outsider

- Relationships first and thoughtful reciprocal collaborations are hard but possible
- You can only co-create as deeply and as far as the trust that is in the room
- As a privileged person, you're responsible for teaching yourself how to engage respectfully



# Synthesis: Challenges

## Sustainability

- Relationships need to be deep and lasting
- Planning for the life of the project beyond the funding cycle
  - Planning for long term impact
- Research vs. programmatic context
  - Relative importance for researchers and partners



# Synthesis: Innovations

- Participatory Community co-design
- Intergenerational learning opportunities
- Take-home learning opportunities
- Take-home materials in different languages to extend accessibility and learning by whole families
- Re-purposing schools as community learning centers outside of school hours
- Tying making to transition experiences that help students in their path especially at challenging junctures
  - (ex. middle to high school transition; internships for college prep)
- Leverage award structure & institutional priorities (ex. Carnegie classification, REU/RET)
- “Guiding Principles” contextualized instead of “Best Practices” - highly dependent on the community



# The Future of Making

## Road map to success

- Personalized
- Co-created
- Culturally-relevant
- Community-driven
- Responsive
- Network of connections/ecosystem
- Exposure/access
- Support

**Expanding definition of identity/groups to broaden - beyond gender and race/culture (e.g. dis/ability, LGBTQ, SES, urban/rural, veteran status, etc.)**



# Envisioning: The Path Forward

**Partnerships/Collaboration:** Information sharing about what is necessary for community participation in research

- **In-person, invitation only event** (in collaboration with partnerships team) - bring community maker groups not previously “at the table,” not previously funded to work with researchers and evaluators interested in working with the community



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NOMCON 2019 Session “Co-creation of NSF-funded maker projects” targeted at this need. For more information about NOMCON 2019: [www.nomcon.org](http://www.nomcon.org)



# Envisioning: The Path Forward

**Partnerships/Collaboration:** Information sharing about what is necessary for community participation in research

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- **Directory** - local match-making between researchers/evaluators and local community
  - Sharing funds so people are compensated for their work: pay/support for community
  - Co-creation between research and site - community participatory research reciprocal model to identify research questions



# Envisioning: The Path Forward

## Information Dissemination/Sharing Guiding Principles

- Guiding principles coupled with examples (vs best practices); issues of localization, context, etc. may make generic “practices” difficult/impossible to state
- Clarifying what IS and what IS NOT broadening participation
- Coupling of stories (case studies) and design processes/patterns
- Sharing a subset of research studies on broadening participation; learning from other previous good work (intentional inclusion)



## Cheat sheet of Guiding Principals - for sharing and online dissemination

### Call to Action - Guiding Principles

#### Access and equity are not the same thing

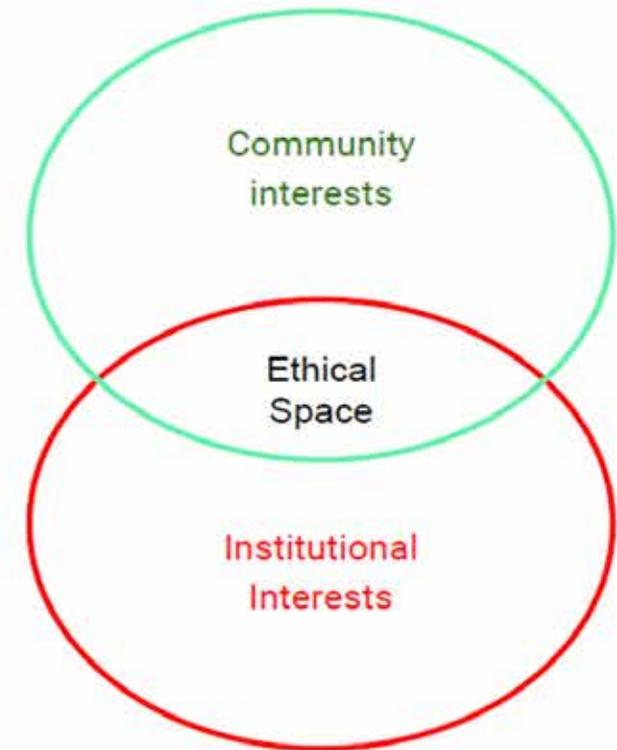
- Spaces and educators' practices need to reflect inclusion
- Pay to play eliminates many working class communities
- Collaborations must consider the power dynamics of all parties
- Consider individual contexts
  - Rural considerations and access look different than urban considerations and access
- Consider pedagogy within access (access alone may not solve a problem)

#### Co-creation is central

- Community Participatory Research
  - Mutually beneficial goals and outcomes; culturally responsive
- Reciprocal model to identify research questions
- Identity (community, cultural, personal, etc.) is intersectional and must be considered
- More research methodologies need to be explored and invented

#### In order to sustain, consider the long game from the get-go

- Rich engagement = long term sustainability
- *Everyone* must get compensated for their contributions



## DEEPER DIVE WEBINARS

Designing for transformative change – each webinar focuses on different areas/context (rural/urban, tribal, gender, ability, etc.)

*Example: “Designing for transformative change - tribal communities”*

### Challenges:

- Perception and identity
- Emphasis: designing *with* particular communities
- Designing with context in mind
- Impact of power dynamics and nature of being an outsider
- Sustainability, relationship building, and project life

### Guiding principals with examples:

- Expectation setting, sharing funds/compensating the community
- Co-creation between research and site
- Clear examples of what IS and what IS NOT broadening participation
- Examples of what has worked in a particular context

### Relevant NSF programs



Questions?  
Comments?  
Other ideas?



# For more information:

- Email the team at [STELAR@edc.org](mailto:STELAR@edc.org)
- View recordings and materials from the series:
  - <http://stelar.edc.org/events/stelar-webinar-series-charting-future-making-stem-education>

