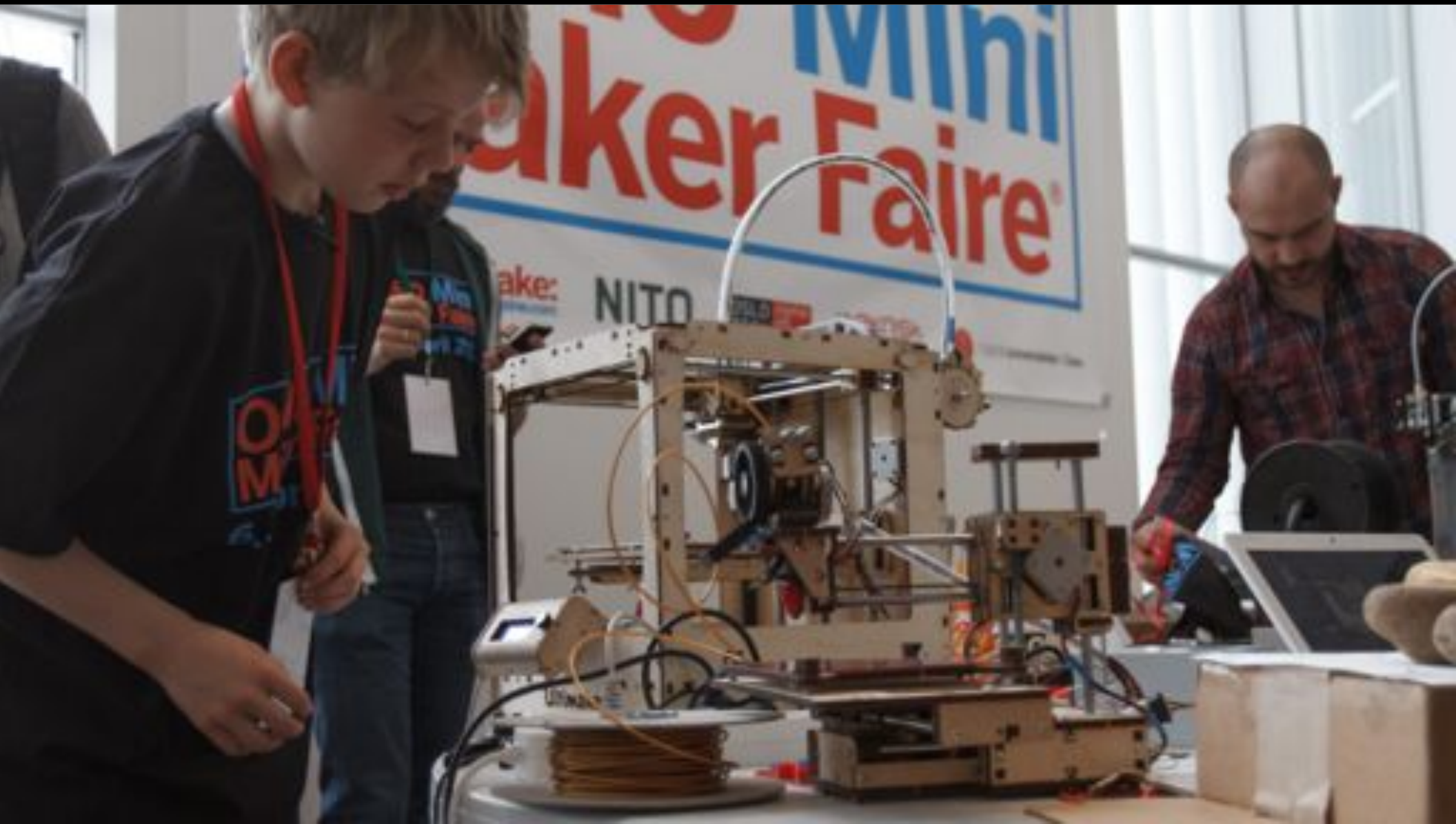


# Culture, STEM Education, & Making

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MAKING









# MAKERS

**THE NEW  
INDUSTRIAL  
REVOLUTION**

**CHRIS ANDERSON**

*Author of the bestseller *The Long Tail**



# INVENT TO LEARN

Making, Tinkering, and  
Engineering in the Classroom

Sylvia Libow Martinez  
Gary Stager, Ph.D.

Maker Ed



Every Child  
a Maker



# Make!

10+ YEARS  
50 COVERS  
44 PEOPLE

MEN & BOYS

86 %

WOMEN & GIRLS

14 %





**Make!**

10+ YEARS  
50 COVERS  
44 PEOPLE

No black person has ever been on the cover of MAKE magazine.

# Make!

10+ YEARS  
50 COVERS  
PROJECTS

|             |      |
|-------------|------|
| ELECTRONICS | 68 % |
| VEHICLES    | 37 % |
| ROBOTS      | 32 % |
| DRONES      | 12 % |
| 3D PRINTERS | 10 % |
| ROCKETS     | 7 %  |

# Make!

2012 STUDY

MEDIAN INCOME OF \$106,000

MORE THAN 82% OF AMERICANS

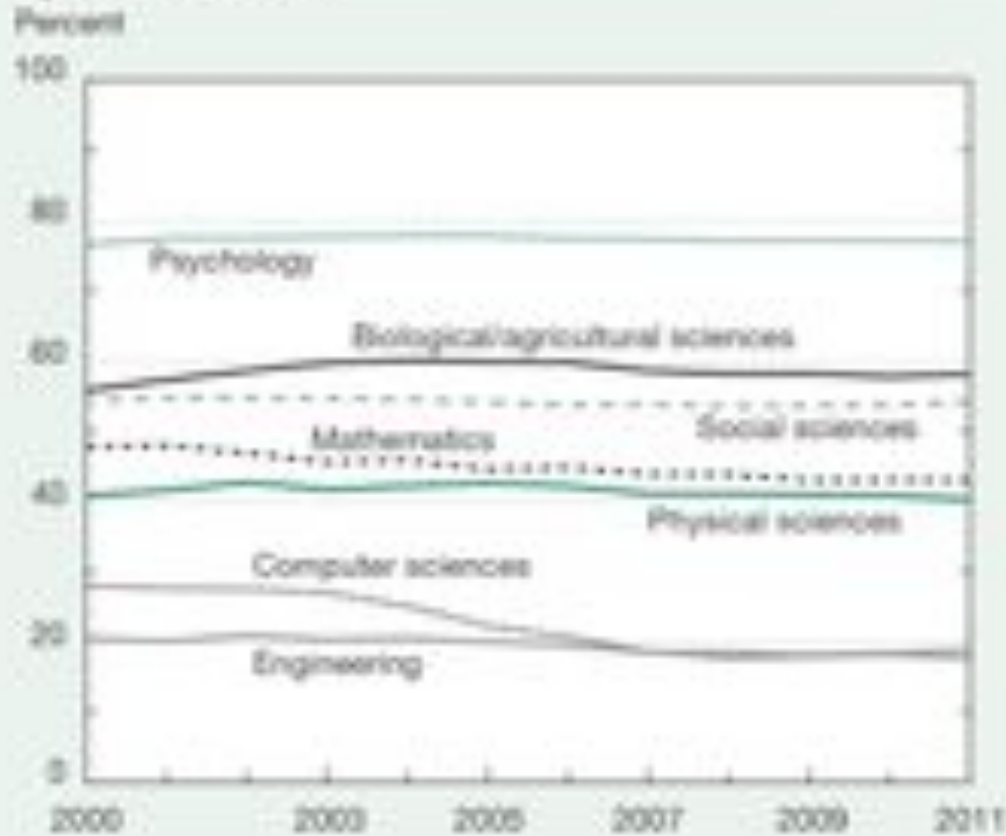
MORE THAN 96% OF AMERICANS





STEM

Figure 2-18  
**Women's share of S&E bachelor's degrees,  
 by field: 2000-11**



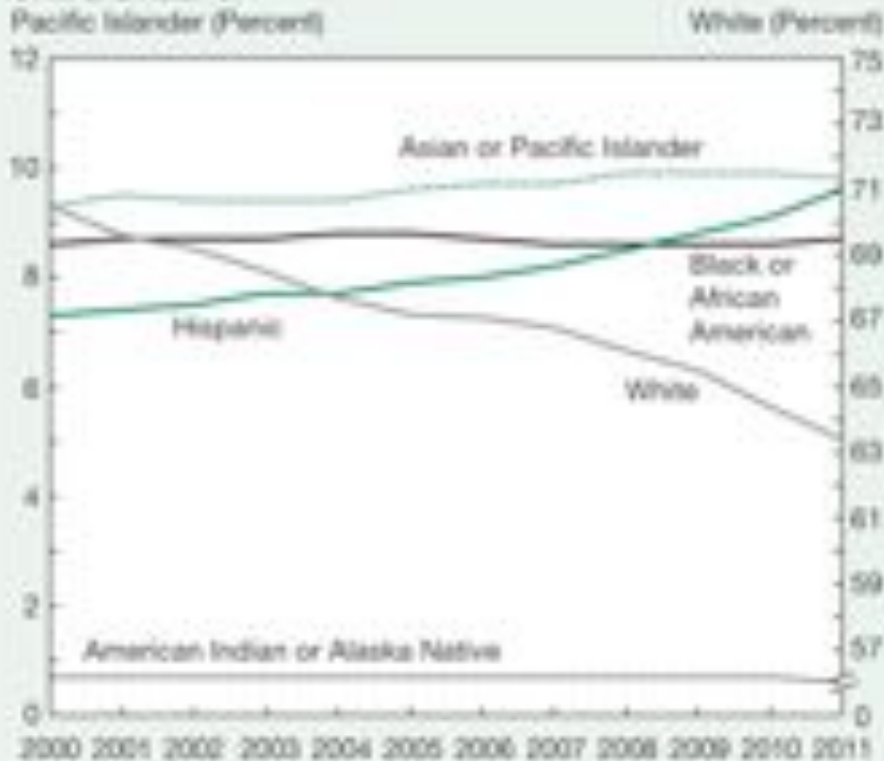
NOTE: Physical sciences include earth, atmospheric, and ocean sciences.

SOURCES: National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey; and National Science Foundation, National Center for Science and Engineering Statistics, WebCASPAR database, <http://webcaspar.nsf.gov>.

Science and Engineering Indicators 2014

Figure 2-19  
**Share of S&E bachelor's degrees among U.S. citizens and permanent residents, by race and ethnicity: 2000–11**

URM and Asian or Pacific Islander (Percent)



URM = underrepresented minorities (black, Hispanic, and American Indian or Alaska Native).

NOTES: Hispanic may be any race. American Indian or Alaska Native, Asian or Pacific Islander, black or African American, and white refer to individuals who are not of Hispanic origin. Percentages do not sum to 100 because data do not include individuals who did not report their race and ethnicity.

SOURCES: National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey; and National Science Foundation, National Center for Science and Engineering Statistics, WebCASPAR database. <http://webcaspar.nsf.gov>.

## Total US Population (2010)

|                                  |      |
|----------------------------------|------|
| Black or African American        | 13 % |
| Hispanic                         | 16 % |
| American Indian or Alaska Native | 1 %  |
| Asian or Pacific Islander        | 5 %  |
| White                            | 72 % |



## Gender Bias in the Purchase of STEM-Related Toys (Fundamental)

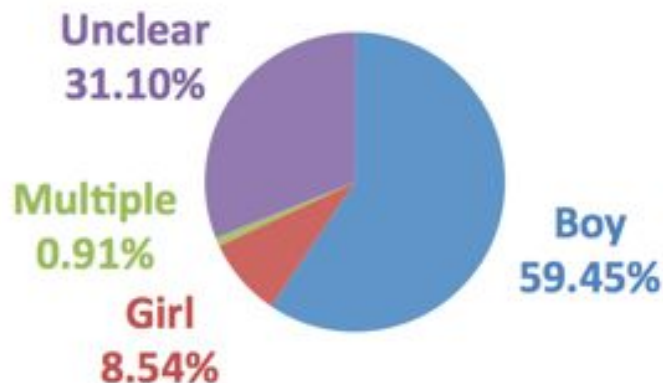
Jacob Inman, INSPIRE Institute for Pre-College Engineering Education

Jacob Inman is an alumnus of the INSPIRE Undergraduate Pre-College Research in STEM particularly in Engineering (UPRISE) Academy. He earned a Bachelor of Science in Nuclear Engineering in 2014.

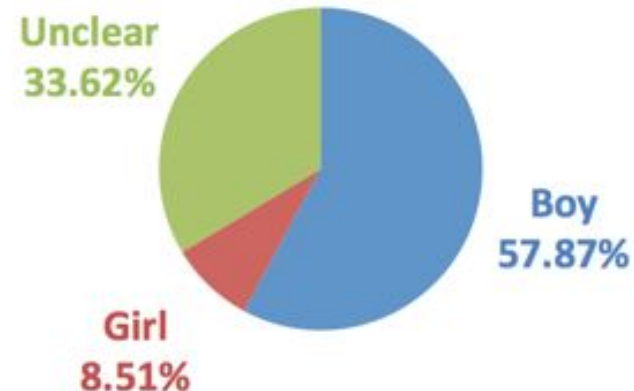
Dr. Monica E Cardella, Purdue University, West Lafayette

Monica E. Cardella is the Director of the INSPIRE Institute for Pre-College Engineering Education and is an Associate Professor of Engineering Education at Purdue University.

### CHILD GENDER (ENGINEERING & CONSTRUCTION) (N=328)



### CHILD GENDER (PHYSICS) (N=235)





# GOOGLE TECH EMPLOYEES

|                           |      |
|---------------------------|------|
| Women                     | 18 % |
| Black or African American | 1 %  |
| Hispanic                  | 2 %  |
| White                     | 59 % |
| Asian                     | 35 % |



IT DOESN'T HAVE TO  
BE THIS WAY

STEM IS EVERYWHERE!







Grandmaster Flash



Seed Pot by Dorothy Torvino  
Acoma Pueblo











STEM IS EVERYWHERE!

HOW DO WE BRING THIS  
INTO OUR CLASSROOMS?

SEE STEM IN THE WORLD

ENGAGE WITH DIVERSE PRACTICES  
IN OUR CULTURE  
IN OUR CLASSROOMS

THINK CRITICALLY



ENCOURAGE STUDENTS TO  
THINK CRITICALLY

# CULTURALLY RELEVANT PEDAGOGY

# CULTURALLY RESPONSIVE PEDAGOGY

# Stanford GSE study suggests academic benefits to ethnic studies courses

“...assignment to [an ethnic studies course] increased ninth-grade student attendance by 21 percentage points, GPA by 1.4 grade points, and credits earned by 23...culturally relevant teaching, when implemented in a supportive, high-fidelity context, can provide effective support to at-risk students.”

Dee, T. and Penner, E. (2016) “The Causal Effects of Cultural Relevance: Evidence from an Ethnic Studies Curriculum”, National Bureau of Economic Research Working Paper Series, No. 21865

TOOLS FOR CHANGE









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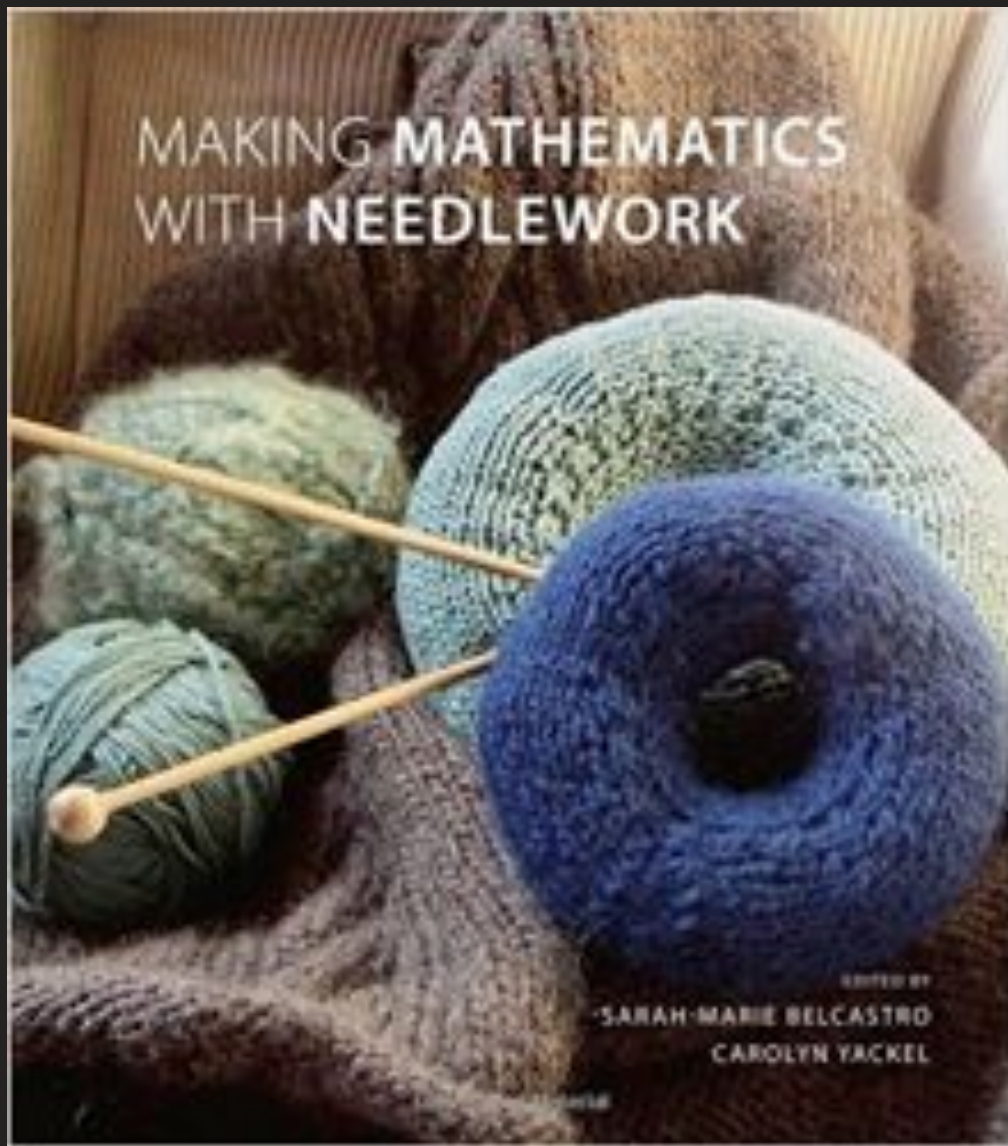
# *Crafting* by Concepts

Edited by  
SARAH-MARIE BELCASTRO  
CAROLYN YACKEL



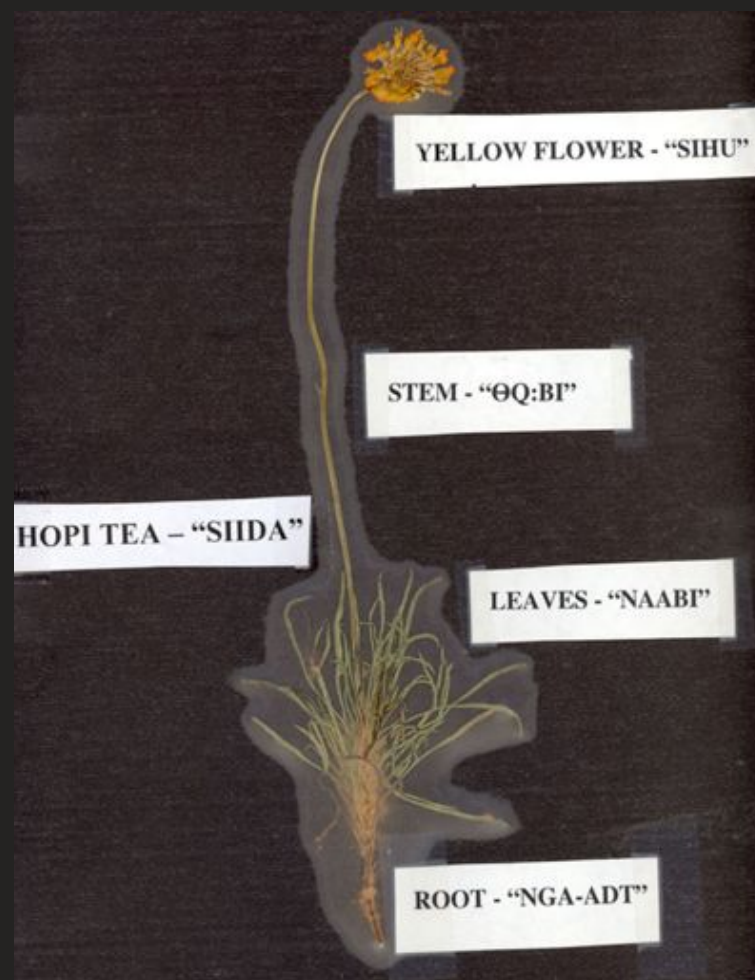
# MAKING MATHEMATICS WITH NEEDLEWORK

Edited by  
SARAH-MARIE BELCASTRO  
CAROLYN YACKEL





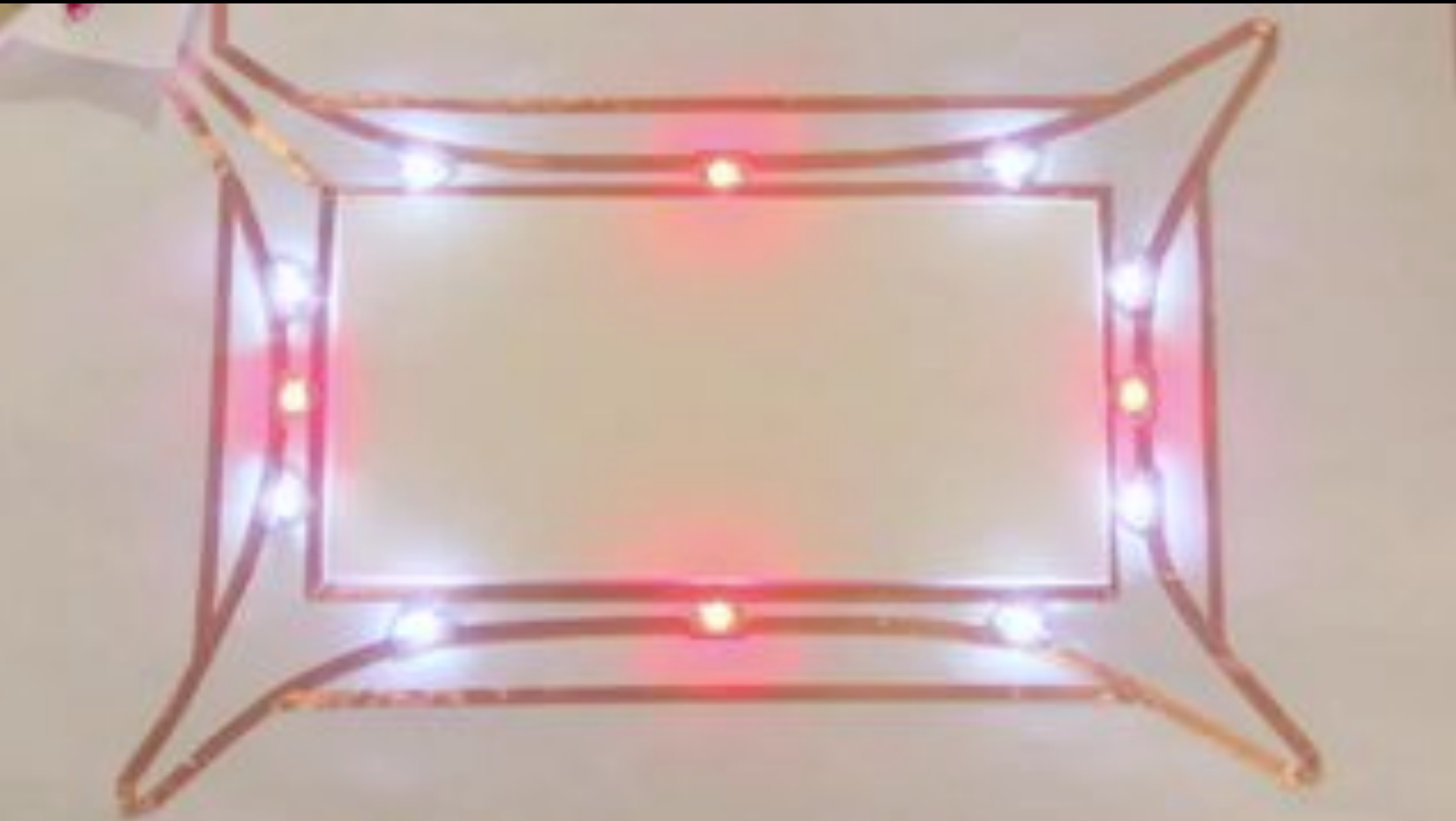
# Culturally Responsive Instructional Resources for American Indian/Alaska Native Students











Ron Eglash  
Culturally Situated Design Tools  
<http://csdt.rpi.edu/>



STEM IS EVERYWHERE  
LET'S SEE IT & CELEBRATE IT

Thank you!

[leahbuechley.com](http://leahbuechley.com)  
[@leahbuechley](https://twitter.com/leahbuechley)