UNIVERSITY OF MONTANA

spectrUMO

MONTANA
MAKERS

Agenda

- **3:00pm - An introduction to spectrUM, the Making Across Montana project, overview and discussion of making and tinkering.**

- **3:20-4pm Iceberg Concept of Culture and discussion of culturally responsive strategies and informal education facilitation techniques vs. in-classroom instruction and felting/fiber arts activity using Iceberg Concept of Culture**

- **4pm - The LAUNCH Cycle of design thinking in the classroom**

- **4:15-4:50— Using the LAUNCH Cycle to create a Makey Makey interactive poster**
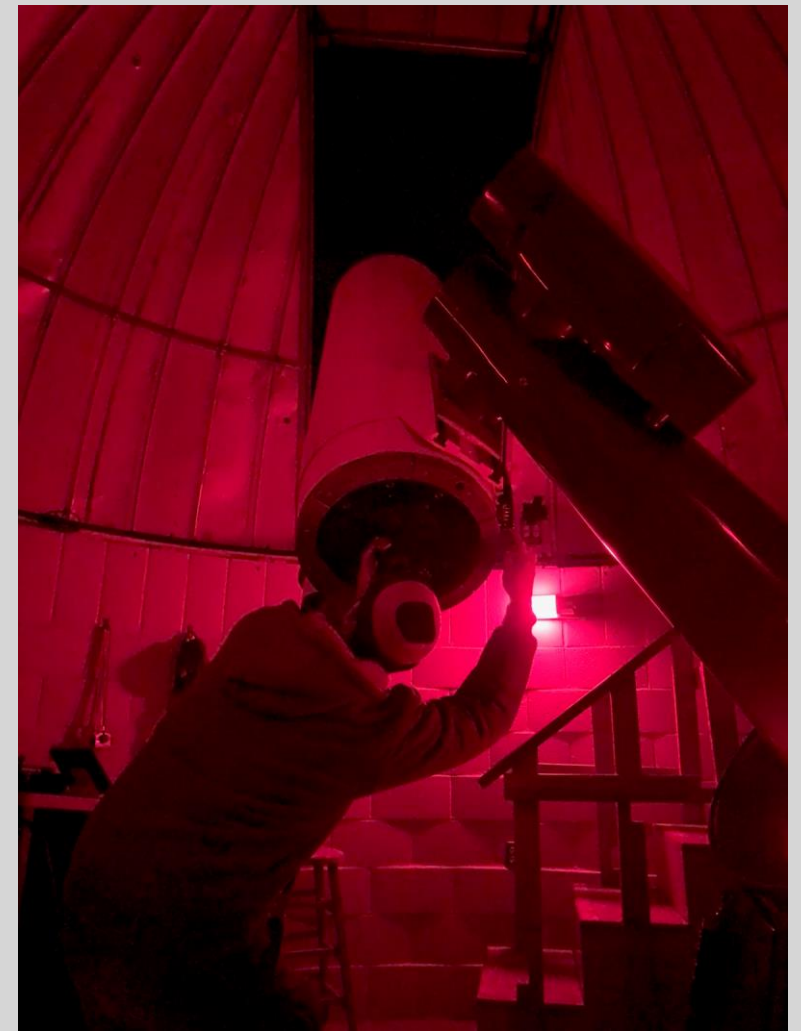
Nick Wethington

Associate Director - spectrUM
Blue Mountain Observatory Coordinator - Physics and Astronomy

Jessie Herbert-Meny
Director
spectrUM Discovery Area
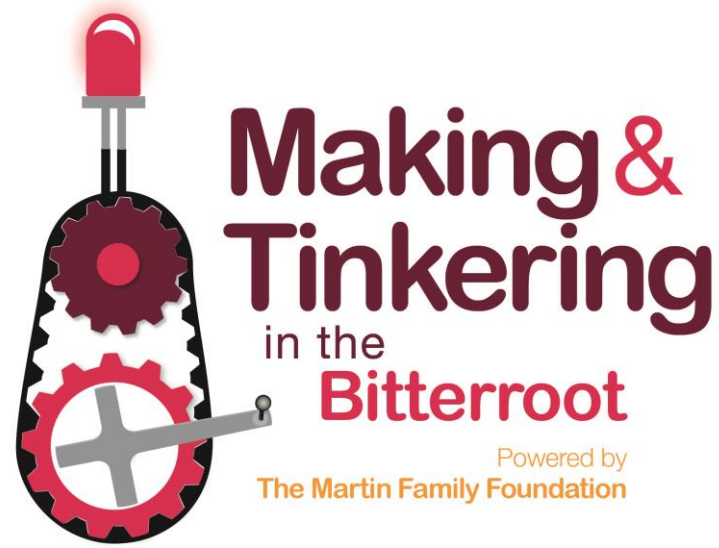
Making and Tinkering in the Bitterroot

University of Montana spectrUM presents **summer of science**

POWERED BY: Jane S. Heman Foundation
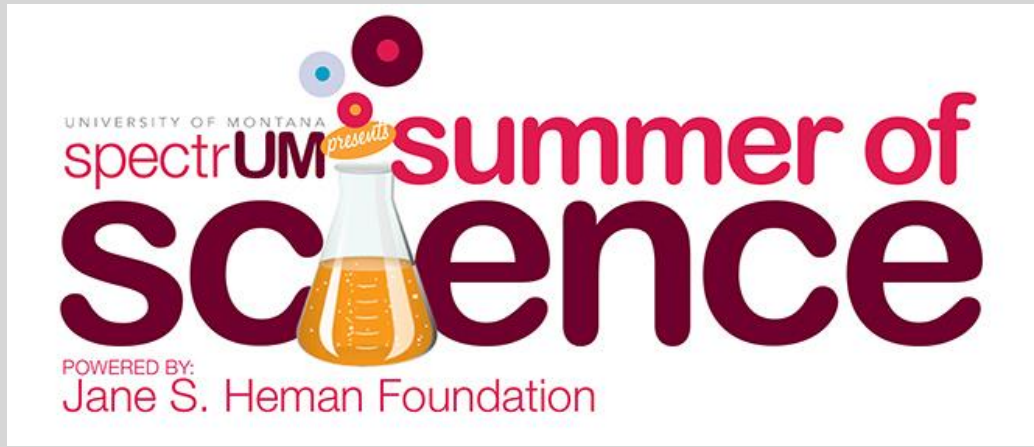
Jane S. Heman Summer of Science and Problem Solvers Science on Wheels

SciNation on the Flathead Reservation
Advisory Committee Members

Whisper Camel-Means
CSKT Natural
Resources Department

Aric Cooksley
Boys and Girls Club of Flathead
Reservation and Lake County

Steph Gillin
CSKT Natural
Resources Department

Cindi Laukes
University of Montana
Neural Inury Center

Michelle Mitchell
CSKT Education Department

LeeAnna Muzquiz
CSKT Health Department and
University of Washington

Amy Vaughan
Boys and Girls Club of Flathead
Reservation and Lake County

Wren Walker-Robbins
Salish Kootenai College

Empowered • STEM • Leaders
SciNation
on the Flathead Reservation

Kʷul ʻIʼtkin Maker Truck

Curriculum and Activities

Cocreating Transformative Change

Making Collective Impact with the Flathead Nation

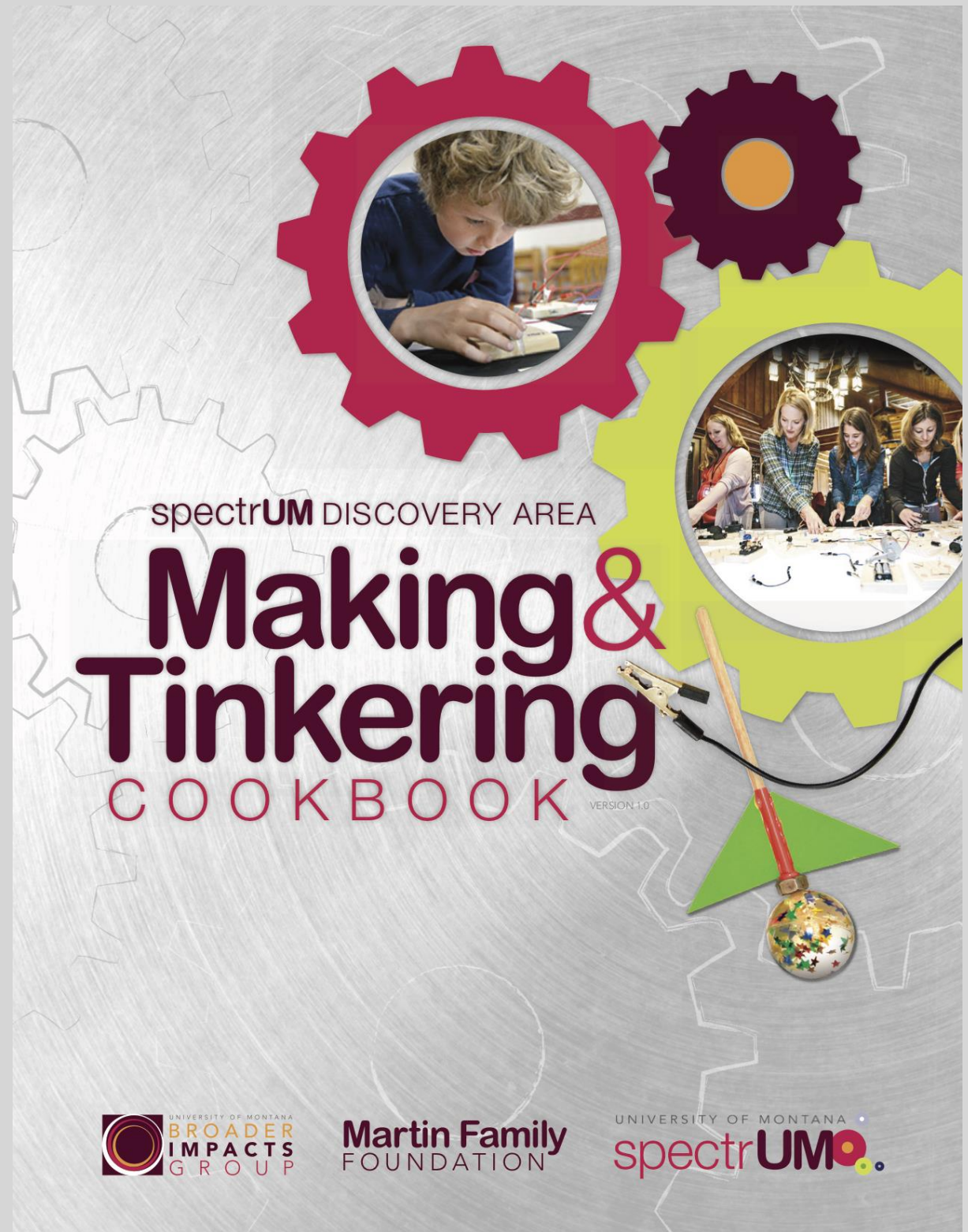Holly Truitt, Ruth Swaney, William Swaney, Nick Wethington, and Nathalie Wolfram

Figure 1: The Kwul 'I'tkin Maker Truck reflects the visual identities of the Confederated Salish and Kootenai Tribes and spectrUM, as well as the local geography of the Flathead Reservation.

Leveraging community to create a mobile, cultural makerspace that travels to schools, powwows, and community events throughout a Native American reservation in Montana.

During a summer 2015 planning session, the University of Montana (UM) spectrUM Discovery Area and our SciNation advisory group on the Flathead Reservation took a hard look in the mirror. With the motto to "just add STEM" (science, technology, engineering, and math) to community gatherings and schools, we had together built a robust portfolio of programming that regularly engaged the reservation's 1,200 Native K–12 students in:

1. an award-winning Science Learning Tent that popped up at the reservation's powwows,
2. "Science Bytes" that embedded role models and hands-on STEM activities at summer free meal sites,
3. community family science nights, and
4. in-school pop-up exhibitions.

SpectrUM, a hands-on science center based in Missoula with statewide mobile programming, engages over 200,000 Montanans annually, including over 8,000 K–12 students and their families on the Flathead Reservation. Our SciNation advisory group had formed in 2013 with seed funding from the Noyce Foundation and later the Alfred P. Sloan Foundation. Collectively, we sought to reimagine spectrUM's existing programming on the Flathead Reservation as culturally relevant, rich with Native and local STEM role models, and aligned with the Confederated Salish and Kootenai (CSK) Tribes' workforce priorities. When spectrUM replaced our go-it-alone, organizationally bound work with a community-based, cocreative approach, increased interest, awards, and funding followed: from the Noyce Foundation, the Simons Foundation, the Coalition for the Public Understanding, and an array of federal and private foundation funding sources.

Yet we realized we were struggling to offer programming in technology and engineering, one of the tribes' workforce priorities. And despite the strides we had made in cocreating culturally relevant STEM programming, we were falling short in providing tech programming, as well as in offering STEM engagement that is culturally relevant throughout. Taking a "balcony" view, we looked at models such as the Spark Truck, a mobile makerspace developed at Stanford and now operated out of the Deason Innovation Gym at Southern Methodist University. We asked questions such as:

- What would a mobile making experience look like on the reservation?
- How might it become uniquely of the community?
- Who might be key partners in designing the truck and its activities?

Figure 2:
Salish elder Eva Boyd guides SciNation member and former tribal education director Bill Swaney and spectrUM partner Dr. Ruth Swaney in a basket-weaving activity as part of the codesign process.

Articles and Research Publications
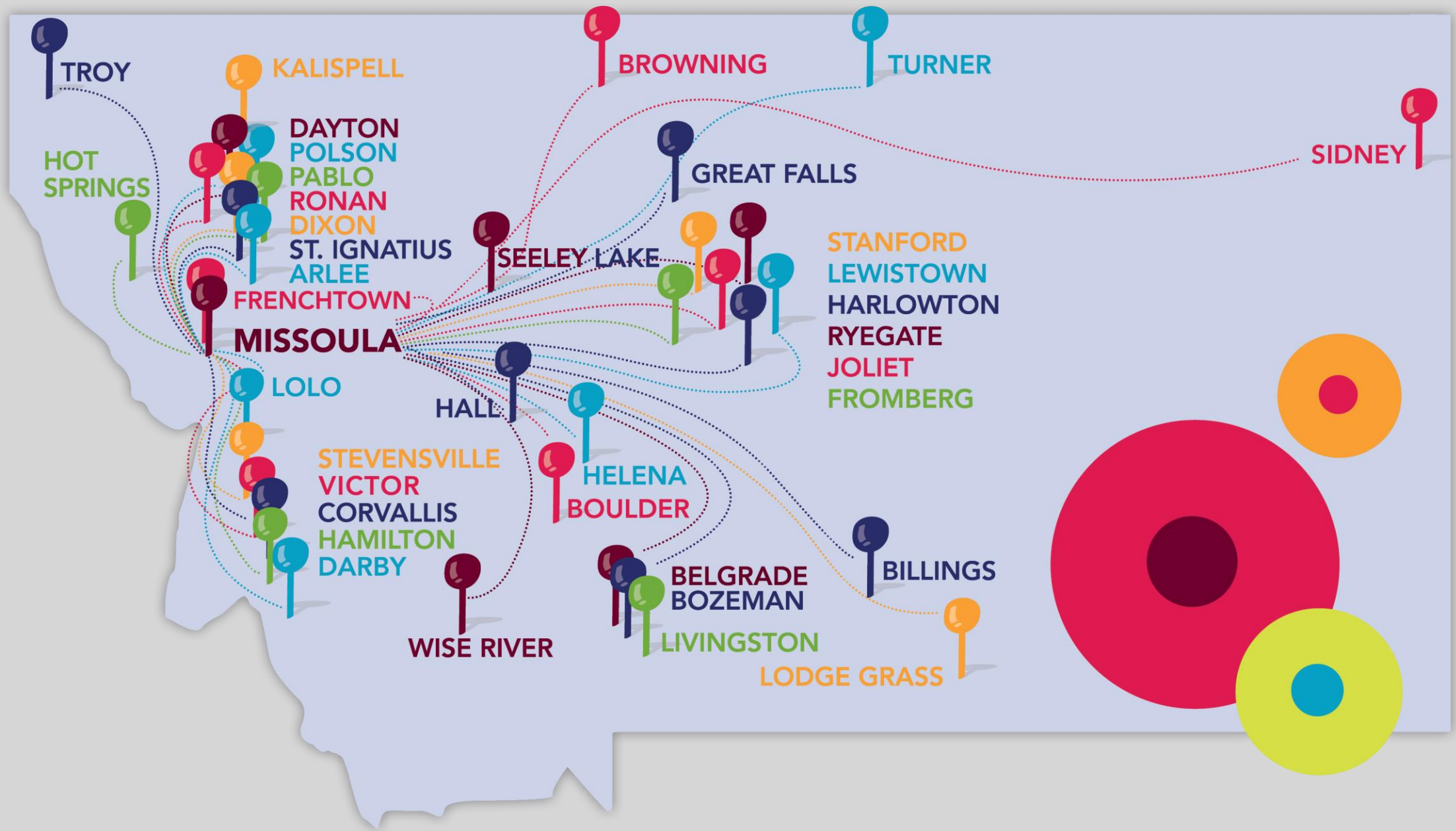
Impact Across MT
(and beyond)

Maker Ed - Making Spaces

Making Across Montana

MONTANA MAKERS

INSTITUTE of Museum and Library SERVICES

Culturally Responsive Teaching and Informal Education

How do you get to know the culture of a group of people that goes beyond the surface?

spectrUM loves the inquiry-based method.

The iceberg concept of culture

Surface Culture
Above sea level
Emotional level: relatively low

Deep Culture

Unspoken Rules
Partially below sea level
Emotional level: very high

Unconscious Rules
Completely below sea level
Emotional level: intense

AFS Intercultural Programs Inc., Copyright 2010
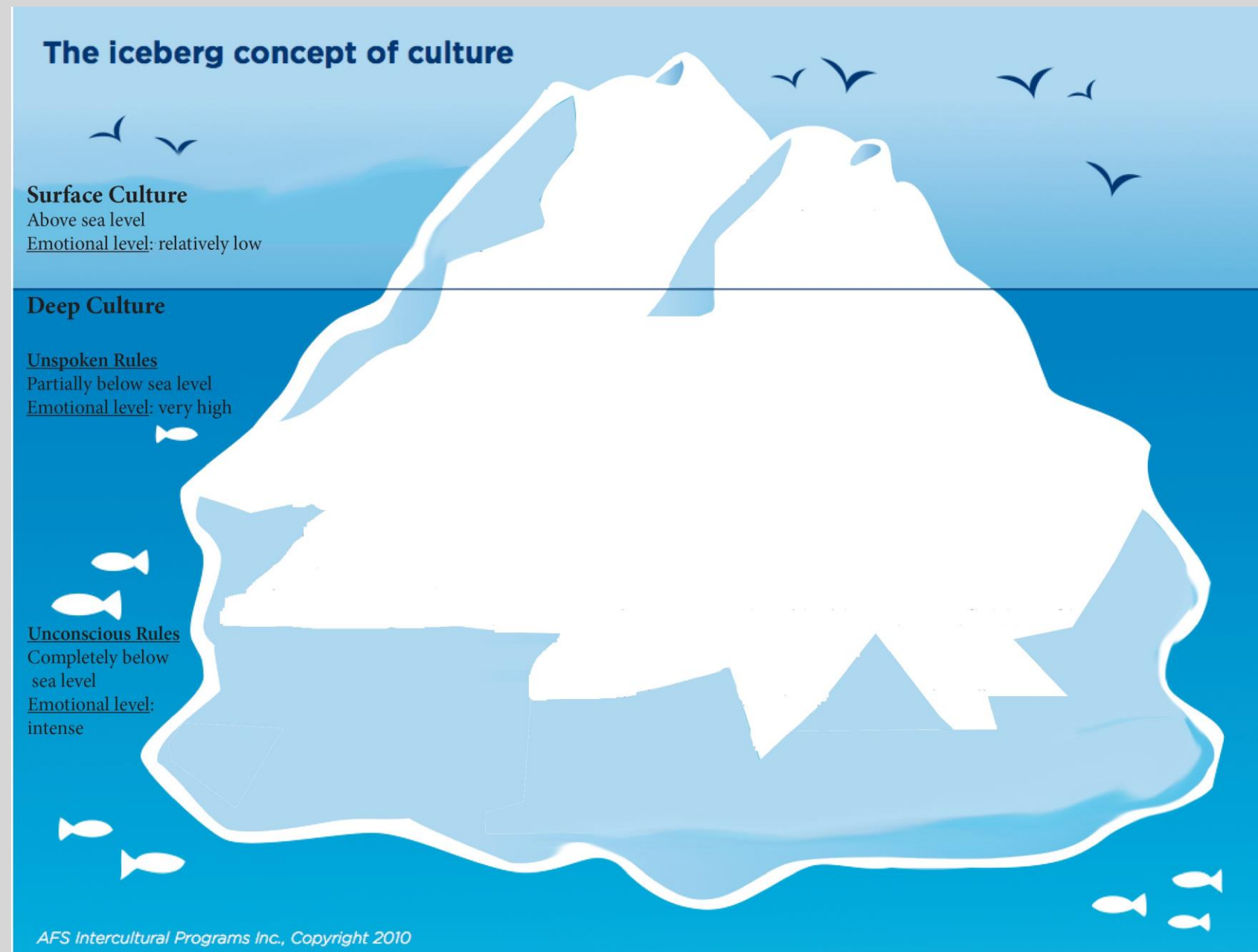
The Cultural Iceberg

In an iceberg, only about 10% of the iceberg is visible above the waterline. The majority of the iceberg is hidden beneath the surface.

In 1976, Edward T. Hall suggested that culture was similar to an iceberg. He proposed that culture has two components and that only about 10% of culture (external or surface culture) is easily visible; the majority, or 90%, of culture (internal or deep culture) is hidden below the surface.

External (surface) culture (10%)

- **Explicitly learned**
- **Conscious**
- **Easily changeable**
- **Objective knowledge**

Behaviours

Traditions **Customs**

Easily observable with touch, taste, smell, sound

Core values **Priorities**

Beliefs

Attitudes

Assumptions

Perceptions

Internal (deep) culture (90%)

- **Implicitly learned**
- **Unconscious**
- **Difficult to change**
- **Subjective knowledge**

Difficult to observe

When one first enters into another culture, one is usually first interacting only with the top 10%—literally, the tip of the iceberg! Sometimes, people make assumptions or develop ideas about another cultural community without really understanding the internal or deep culture that makes up the majority of that culture's values and beliefs. What's in your cultural iceberg?

Felting Geodes

Pick 3 colors
-1 for surface culture
- 2 for deep culture

Felt a sphere, and discuss how you might use this with students in your class. How do you like to get to know the culture of your students? What is your favorite way to teach in a culturally responsive manner? How could this activity align with your curriculum?

The LAUNCH Cycle

THE LAUNCH CYCLE
A DESIGN THINKING FRAMEWORK BY JOHN SPENCER AND A.J. JULIANI

LOOK, LISTEN, AND LEARN
ASK TONS OF QUESTIONS
UNDERSTAND THE PROCESS OR PROBLEM
NAVIGATE IDEAS
CREATE A PROTOTYPE
HIGHLIGHT AND FIX
LAUNCH TO AN AUDIENCE

JOHN SPENCER
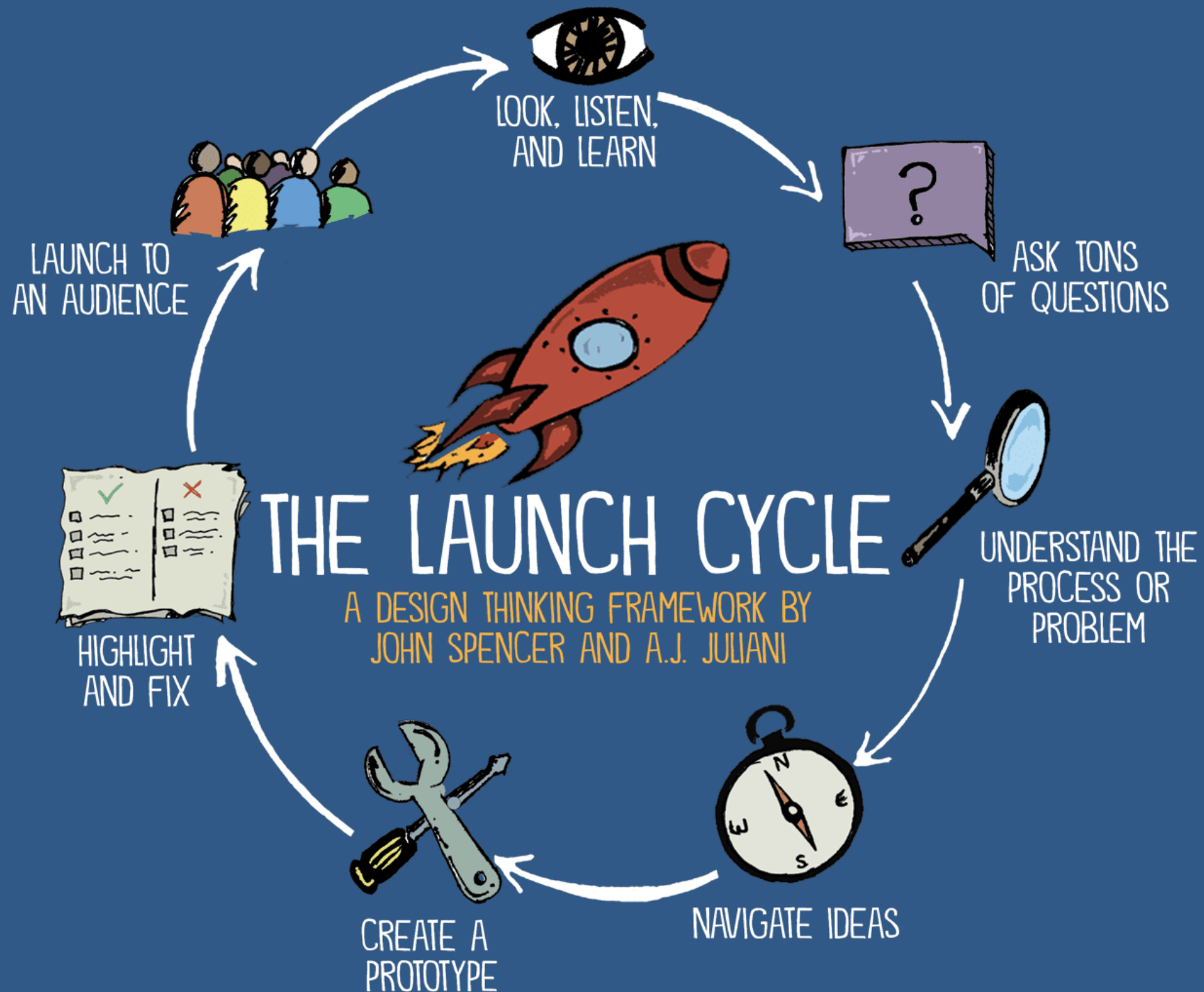
Design thinking takes time. There are no easy shortcuts. But one of the lessons I learned is that it's not about adding another thing to my plate. It's about rearranging the plate — or better yet, letting students be the chefs.

In my experience, I cut down on direct instruction, cut out the weekly quizzes, and allowed for more time for students to work collaboratively and independently on their design projects.

It actually felt less rushed or frantic.

JOHN SPENCER

Makey Makey Interactive Posters!

- Work in groups of 4-5
- Create a poster using **[Makey Makey that is interactive](#)**
- **[Examples of previous posters](#)**
- If you can't come up with a theme - something you've always wanted to do with your students but haven't had the time (each person can contribute an idea)
- Launch it at the end - 4:35ish

Post Workshop Items

- **Fill out our survey:**

- [**tinyurl.com/MFPESurvey**](tinyurl.com/MFPESurvey)

Post Workshop Items

- **Link to PD Resources:**

- **tinyurl.com/MTMakersPD**