Knit by Numbers:

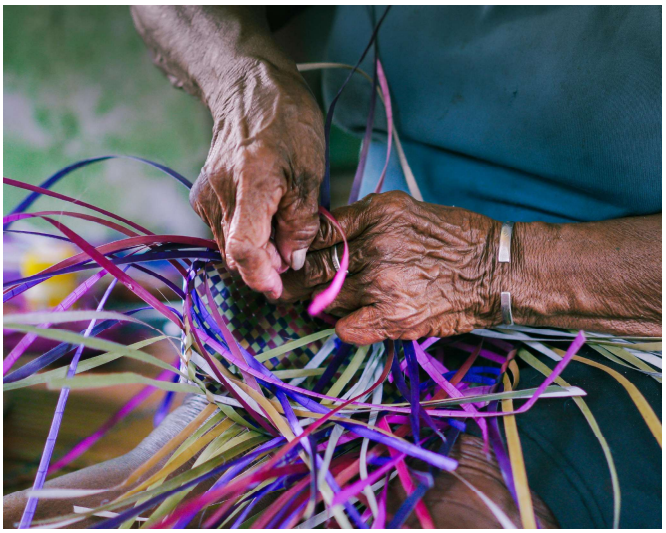
Craft-based approaches to data literacy instruction

California Conference on Library Instruction
May 29, 2026

Accessibility Note:

Some of the presentation activities require manual dexterity.

We will circulate to provide assistance!



Hello, and welcome!

Sheena Campbell
she/her
STEM Librarian
UC Davis Library

Megan Van Noord
she/her
Health Sciences Librarian
UC Davis Library

This presentation brought to you by...

Thanks,

Priscilla Carmini
Digital Repositories Librarian
University of Waterloo

Alexandra Wong
Data Visualization Librarian
York University

TORONTO IDEAL CONFERENCE 2024

...and our workshop sponsor, LAUC-D!

Thanks to the Librarians Association of the University of California Davis for funding

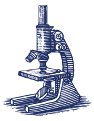
Session Agenda

Exploring Data Physicalization

- Examples across time and cultures

Our Context as a Case Study

- Learn more about how the UC Davis Library partnered with our campus Craft Center to offer data literacy workshops in the Textile Studio



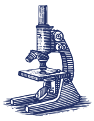
Physicalizing your Values

- Professional values, theories, and applications

Session Goals

At the end of this session, participants will be able to describe different examples of data physicalization and how it may be applied with a variety of datasets.

Participants will evaluate how creative methods of “making” can foster accessible pathways in data education, expanding the perceived boundaries of data literacy.



Participants will apply principles of data physicalization by transforming information into tangible forms through craft-based media (e.g., knitting), developing a multimodal understanding of data communication.

Exploring Data Physicalization

What is Data Physicalization?

A data physicalization is a physical artifact whose geometry or material properties encode data.

Opportunities and Challenges for Data Physicalization (Jansen et. al., 2015)

Data Physicalization across time & cultures

Haudenosaunee Wampum Belts

Data Physicalization across time & cultures

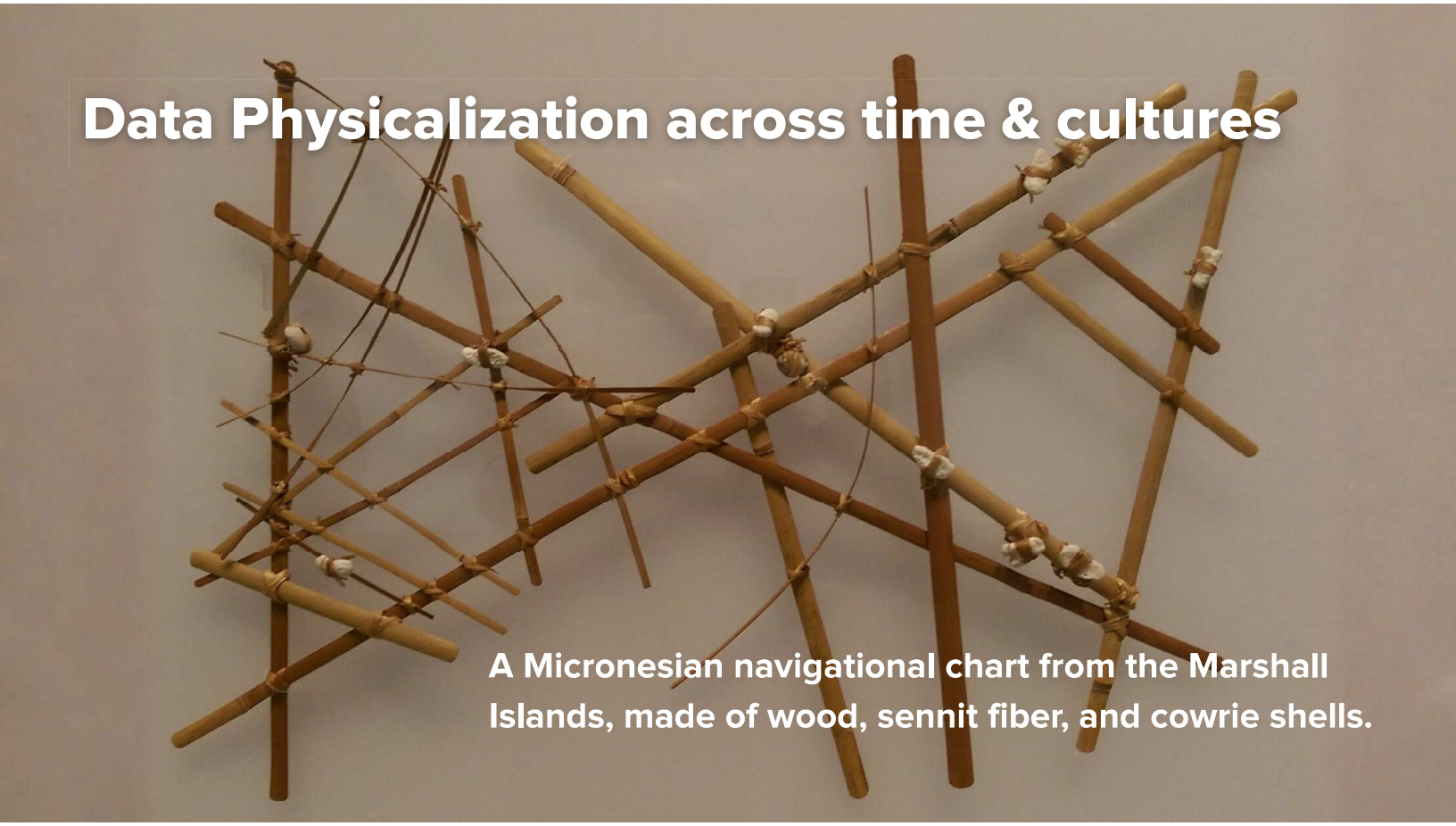
Quipus (talking knots) were record-keeping devices for ancient Andean civilizations

Data Physicalization across time & cultures

Lukasa memory board,
Mbudye Society, Luba peoples
(Democratic Republic of the Congo)

Data Physicalization across time & cultures

A child plays with a giant abacus at Mozi Memorial Hall in Tengzhou city, Shandong province.

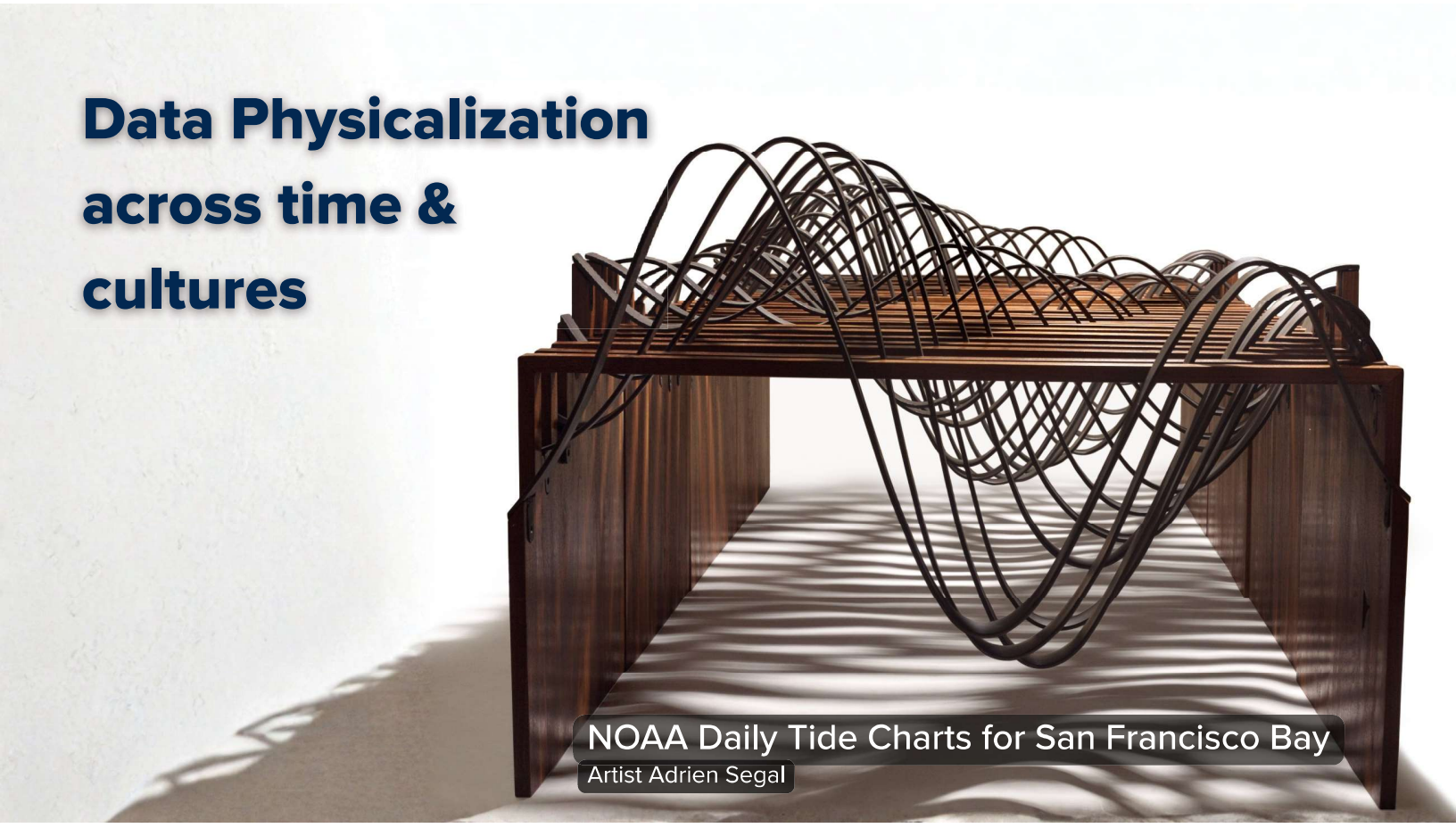

Data Physicalization across time & cultures
A Micronesian navigational chart from the Marshall Islands, made of wood, sennit fiber, and cowrie shells.


Data Physicalization
across time & cultures
Scottish tartan encodes geneological data

Data Physicalization across time & cultures

Worry Beads by Loren Madsen EACH represents one year and is scaled at one cc per human life. The volume of each bead is set by the number of deaths due to mass shootings for that year globally, starting with the year 1945.

Data Physicalization across time & cultures



NOAA Daily Tide Charts for San Francisco Bay

Artist Adrien Segal


Data Physicalization
across time & cultures
Roxbury
"Soft City" by just practice

Data Physicalization Activity #1

Conference Commute Data

Teaching Data Physicalization

Why engage with Data Physicalization?

Connect

Physicalized data encourages greater analysis with the context and findings

Experience

Supports deconstruction, ‘critical making’ and reflection with data

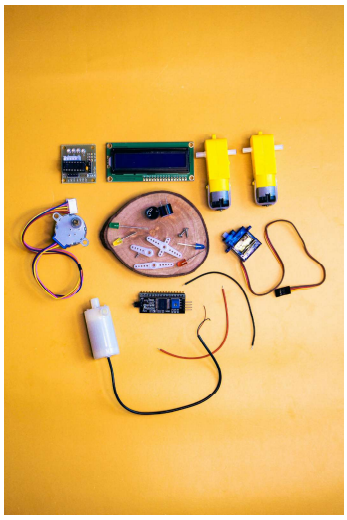
Enhance

Materiality changes the practice of interacting with data through sensory experience

Capture

Gives real form to gathered data and provides an alternative entry point for building data literacy

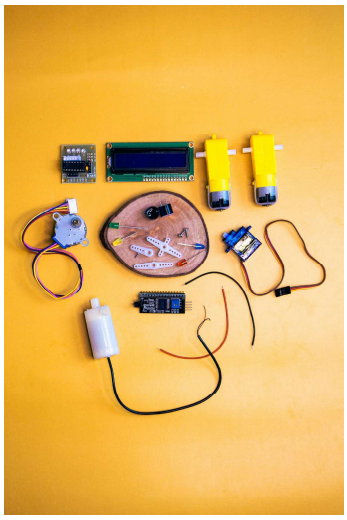
Data Physicalization as Critical Making



Critical making describes the combination of critical thinking with hands-on making.

It is a pedagogical practice that uses material engagements with technologies to deconstruct and extend critical social reflection.

Data Physicalization as Critical Making



"Critical making is an elision of two typically disconnected modes of engagement in the world—'critical thinking,' often considered as abstract, explicit, linguistically based, internal, and cognitively individualistic; and 'making,' typically understood as material, tacit, embodied, external, and community-oriented."

(Ratto, 2011)

Data Physicalization as Experiential Learning

Research supports the notion that students benefit from spending time working and learning in community contexts where students can apply theory and increase their awareness of social issues.

(Markus, Howard, & King, 1993)

Data Physicalization as a Pedagogy of Care

A pedagogy of care is an educational approach prioritizing student well-being, empathy, and relationships as the foundation for learning.

It transforms traditional teaching into a compassionate practice, utilizing flexibility, trust, and trauma-informed methods to create an inclusive environment.

(Gay, 2018)

Our Context

The UC Davis Library as a Case Study

Library Strategic Plan 2022-2027

Priority 2: Empower diverse campus communities to succeed via education, public engagement, and community partnerships

Priority 3: Advance our role as a catalyst for research, collaboration, and equitable access to knowledge.

Knitting as Data Physicalization

Knitting translates abstract information into tactile, three-dimensional objects. This approach—often referred to as data physicalization or "data knitting" — uses traditional craft techniques (like stitch types, color changes, and row counts) to encode raw datasets. It creates tangible artifacts that offer a deeply personal and visceral interaction with data.

Knitting as Data Physicalization

Knitting uses an inherent binary and algorithmic structure that makes it uniquely suited for coding data

- Color Mapping: A popular method is mapping numerical ranges to specific yarn colors. For example, a temperature-tracking "temperature blanket" uses a designated color for every day's high or low temperature, where one row equates to one day.
- Stitch Variations: Different stitch types (knits vs. purls) can represent binary choices, discrete categories, or sequential numbers.
- Patterns and Shaping: Increases and decreases in a pattern can track positive or negative trends, while dropped stitches or textural changes can mark specific anomalous events in a timeline.

Knitting as Data Physicalization

The Tempestry Project is a collaborative fiber arts initiative that presents global warming data visually through knitted or crocheted artwork.

Data Physicalization as Experiential Learning

Knitting and other textile crafts require quantitative skills

Skills may include:

- Reading a data table
- Manipulating and analyzing data
- Understanding biases in data
- Thinking critically about how data is collected and used as empirical evidence across disciplinary fields

Data Physicalization as a Pedagogy of Care

Knitting and other textile crafts as a “soft” entry point to approaching “hard” data

- Embodied Engagement: Crafting data forces a slower, more intentional engagement with the numbers. The physical weight, texture, and time required to make the object reflect the data's scale.
- Tangible Accessibility: It breaks data out of digital silos, making complex information easier to understand and discuss.
- Personal Attachment: Transforming abstract statistics into a cherished, usable item gives the data personal, often lasting, significance.

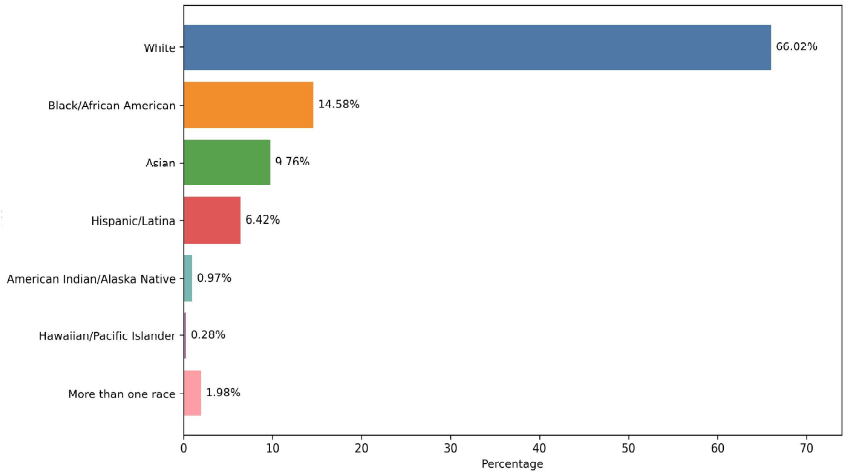
Why engage with Knitting Data?

In 2021, while 24% of U.S. workers held a STEM occupation, 18% of female workers held a STEM occupation—three-fifths the rate of male workers (30%)

"The STEM Labor Force: Scientists, Engineers, and Skilled Technical Workers" (May 2024)

SCIENCE & ENGINEERING INDICATORS

Why engage with Knitting Data?



Women in STEM Workforce by Race:

- **White: 66.02%**
- **Black/African American: 14.58%**
- **Asian: 9.76%**
- **Hispanic/Latina: 6.42%**
- **American Indian/Alaska Native: 0.97%**
- **Hawaiian/Pacific Islander: 0.28%**
- **More than one race: 1.98%**

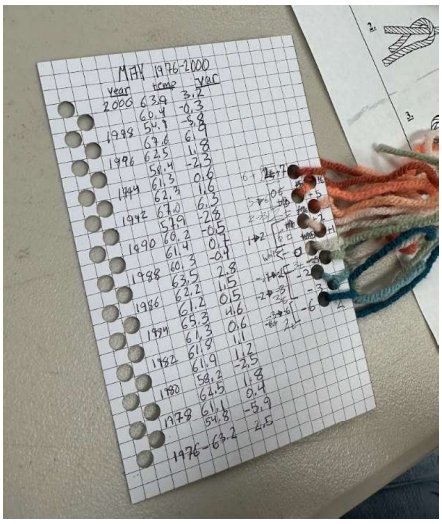
"The STEM Labor Force: Scientists, Engineers, and Skilled Technical Workers" (May 2024)

NSF | NSB SCIENCE & ENGINEERING INDICATORS

Knitting Climate Data Workshop

Analyze Data

Apply fundamental data skills to collect, identify, and analyze data in order to create a pattern using a visual encoding scheme.



Knitting Climate Data Workshop

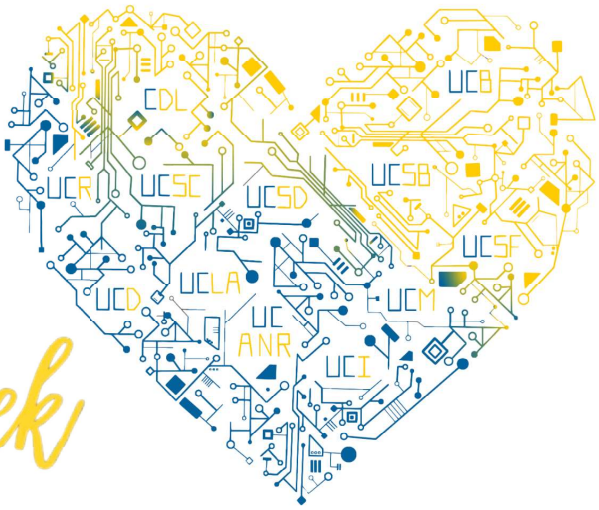
Physicalize Data

Apply the visual encoding scheme to create a physical object whose material dimensions embody data analysis.

UC

love Data Week

FEBRUARY 9-13, 2026



UC DAVIS LIBRARY

Knitting Climate Data Workshop

Formed new partnership with the Craft Center due to typically low attendance for library workshops

- recreation registration portal
- independent listerv

Knitting Climate Data Workshop

Workshop Overview:
Participants use NOAA temperature data to design a color-coded knitting pattern that represents long-term climate variation. Through crafting and discussion, students explore how data is collected, interpreted, and represented.

Audience:
Undergraduate and graduate students

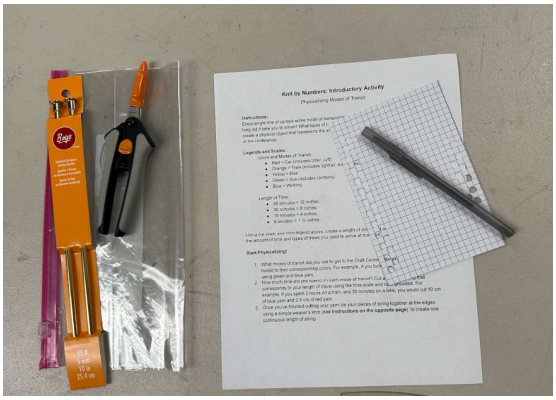
Duration:
3 hours

Knitting Climate Data Workshop

Learning Objectives:

- Explore the practice of data physicalization.
- Translate climate data into a visual and tactile representation (a washcloth).
- Practice basic knitting techniques, including casting on, knit stitch, and casting off.
- Reflect on how data collection and management shape our understanding of environmental change.

Knitting Climate Data Workshop



We split the agenda into exploring:

- data physicalization practices
- data collection and analysis
- knitting as data physicalization

Knitting Climate Data Workshop

Offerings:

- 2 in Winter
- 2 in Spring

Attendance:

- varied (3-10)

Student demographics:

- mostly stem/social science
- mostly female and non-binary
- majority non-white

Knitting Climate Data Workshop

What we learned

- Math anxiety is real...craft anxiety is too
- Students need more fun datasets to practice with in their courses
- There is a gap in discussions about data ethics and data sovereignty in courses

Data Physicalization Activity #2

Professional Values Data

Reflection

Knitting as Information Creation

Drawing from the revised ACRL "Framework for Information Literacy," Information Creation as Process, learners who are developing their information literacy abilities:

- recognize the ambiguity that is sometimes involved in the information creation process;
- develop, in their own creation processes, an understanding that their choices impact the purposes for which the information product will be used and the message it conveys;
- value the process of matching an information need with an appropriate format;
- develop an awareness that the creation of information may develop through communicating in a range of formats or modes;
- understand that different methods of information dissemination with different purposes are available for a learner's use.

Knitting Climate Data Workshop

What are potential partnerships for offering craft-based workshops at your campus?

Take a moment to consider spaces where students gather for recreation, community building, or play.

Knitting Climate Data Workshop

Other insights and considerations:

- Recommend a 3:1 student-to-librarian ratio
- Paying a nominal fee may help with attendance
- Consider popular class schedules/times
- Partnering with other depts/orgs may limit your control over timing and space
- Bring snacks and a playlist!
- Cut yarn ahead of time 😮‍💨

Developing Information Play Workshop Series

Future partnership with the Craft Center:

- zines
- book binding
- paper making
- board game design
- cross stitch vector maps

Everything you Need

Offer your own Knit by Numbers: Crafting Climate Data Workshop

Link to Google folder

bit.ly/42UpK6J

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