

About the Project

TechTales is a three-year project funded by the National Science Foundation that has three phases:

- (1) design family workshops to engage families with robotics, e-textiles, coding, and scientific phenomena,
- (2) design family “robotics backpacks” to be checked out from libraries and community settings that contain all materials (laptop, robotics components, challenges, and wireless hotspots) for families to engage in engineering learning at home, and
- (3) to disseminate the program to more library branches.

Resources for extending learning outside of the workshops

We also have designed “booster days”, or drop-in ½-day events for families who have already attended TechTales to build on and extend their learning from the original workshops. These booster days took up the storytelling aspect of the original family workshops by being centered around storybooks such as *Thunderboy Junior* (Alexie, 2016) and *Those Darn Squirrels* (Rubin, 2011) and challenged families to interpret part of the books and apply their robotics knowledge. As we move forward, we intend to hold annual meetings for greater participation with potential partner institutions.

Resources for facilitators:

<https://techtaleweb.wordpress.com>
STEM teaching tools: <http://stemteachingtools.org>
Facilitator and family guides

Tech Tales Schedule

Every workshop day has four sections:

- DAY 1: GET TO KNOW YOU**
Get to know each other! Who is in your community? What do you think about robotics?
- DAY 2: STORIES**
Learn about energy and think about your family's stories.
- DAY 3: INTRO TO ROBOTICS**
Use new tools, old tools, and your creativity to tell your stories.
- DAY 4: MAKING & BUILDING**
Get fancy with it! Focus on programming and building your project.
- DAY 5: SHOWCASE AND CELEBRATION**
Share your stories and what you learned, and celebrate your community!



QUESTIONS?

What expertise and resources might your institution or community bring to a program like Tech Tales?

What types of needs might a program like TechTales fill for your communities?



TECH TALES

MAKE. LEARN. SHARE.



Stories Across Time

“I don’t remember much from when I was seven years old, and by doing this whole Tech Tales story, we all have a shared memory and I’m curious when she turns 12, when she turns 20, will she remember that whole lightning storm? Which, if we hadn’t talked about it, if we hadn’t done this whole Tech Tales, would it be totally lost?” [Geha Pony]

What did you learn about your family?

“I learned that [Greene] is actually pretty good at programming, and it was something that she caught on to a lot faster than I would have expected...” [Ann Pony]

Nanabozho Steals Fire

The Springer family chose a family story that connected to an Ojibwe cultural story of Nanabozho the trickster spirit who appears in the form of a rabbit, stealing a spark of fire for the people. One night while on a family camping trip in the Pacific Northwest, a rabbit approached their family's campfire. Nimkii said, “look, Nanabozho has come to steal the fire!” The father took a picture with his phone, and the photo showed only a bright white blur of light where they had seen the rabbit. They created a diorama that flips between the timeless story and their camping trip, using motors and pulleys to flip through cut out scenes, and LEDs that light up the set. Importantly this story was one way this family started to feel like the belonged after a recent move and the diorama making served as a way to solidify and remember this new phase of their lives.

Initial Findings

Over the course of five 3-hour sessions, TechTales centers nondominant families’ stories and storymaking processes as a means of re-positioning and desettling (Bang, et al., 2012) families’ relationships to technology. Rather than positioning families as consumers or users of technology--in other words, simply showing them “how-to”--TechTales invites families to imagine new relationships with technology that are deeply interwoven with cultural, familial, and place-based historicity. At the center of the design is the recognition that all learning is cultural, and that all families and family members come to the workshop space with deep expertise around their own histories but also possible fraught relationships with technologies, especially if those technologies have served to erase, invisibilize, or assimilate their communities (Bang et al. 2013). Importantly our workshops sought to see technologies as also cultural; emergent and reflective of the cultural communities that they have emerged from. We were intentional about positioning families to take a kind of critical view of technologies by asking them to reflect on the technological histories, uses, and expertises embedded in their own families and communities and to consider how these have evolved.

As families animate their stories through robotics and programming through Scratch, they engage in playful and creative interactions, connecting relations and stories (stargazing, eagle relatives visiting, returning to Africa to reunite with family) with contemporary technologies (LEDs, motors, sensors), and they identify and explore new (or prior) interests while developing new competencies in multiple disciplinary forms of work (art, computer science, electrical engineering, and robotics).

Family members develop skills that are demanded in the 21st century, not being dominated by new technologies, but practicing indigenous ways of thinking. Representational complexity in pottery patterns and textiles are examples of computational thought that is used in computer programming, and technologies of navigation by water and the development and use of tools for creating canoes are feats of engineering. While making their projects, families have talked about their relationships to land and cultural practices, which are not often accessed or valued in conventional computer science environments. The artifacts of robotic dioramas can embody practice but also “collective remembrance (p 61)” within and across figured worlds (Holland, et al, 1998).



Literature Review

Through the practices of storytelling, making, and design, families build layers of identity, what Holland and Leander (2004) call *lamination of identity*. In this sense, families’ relations to land, each other, their stories and histories, and to technology/ making are all layered into their process as we observe them bringing their stories to life and in their final projects.

Holland et al (1998) help us think about the *figured worlds of family learning*. Figured worlds are historied, socially organized, and reproducible through social interactions. From this lens, we can look at two aspects of figured worlds of family learning:
1. the artifacts—memories, physical materials, stories—that serve as tools of “collective remembrance” (p.61) within and across figured worlds. These artifacts can cross space-place-time.
2. identity dynamics and making within families as they engage in multiple structures of social practice (Dreier, 2009).

Archibald, Jo-ann. (2008). *Indigenous Storywork: Educating the Heart, Mind, Body, and Spirit*. University of British Columbia Press. Deep interrelationship between the story, storyteller, and listener Storywork as identity work

Bang, M., Warren, B., Rosebery, A. S., & Medin, D. (2012). *Desettling expectations in science education*. *Human Development*, 55(5–6), 302–318.

Digiacoio, D., & Gutiérrez, K. (2015). *Relational Equity as a Design Tool Within Making and Tinkering Activities*. *Mind, Culture, and Activity*, 1-15. The organization of making and tinkering activities that afford for more symmetrical relations, or relational equity.

Dreier, O. (2009). *Persons in structures of social practice*. *Theory & Psychology*, 19(2), 193-212.

Holland, D., & Leander, K. (2004). *Ethnographic studies of positioning and subjectivity: An introduction*. *Ethos*, 32(2), 127-139.

Kafai, Y., Searle, K., Martinez, C., & Brayboy, B. (2014). *Ethnocomputing with electronic textiles: Culturally responsive open design to broaden participation in computing in American youth and communities*. In *Proceedings of the 45th ACM technical symposium on computer science education* (pp. 241–246). New York: Association for Computing Machinery.

Medin, D. L., & Bang, M. (2014). *Who's asking? Native science, western science, and science education*. Cambridge, MA: Massachusetts Institute of Technology Press.

Rogoff, B. (2014). *Learning by Observing and Pitching In to Family and Community Endeavors: An Orientation*. *Human Development*, 57(2–3), 69-81.

Smith, L. T. (2012). *Decolonizing methodologies: Research and indigenous peoples*. London: Zed Books.

Our Design Principles

