

## Designing for technological sovereignty: Forms of relating with culture and technology through community workshops

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**Abstract:** As new technologies proliferate our world, many well-meaning efforts seek to expand access to and broaden participation in STEM education and careers, yet many of these efforts disregard the fact that science, technology, and design are cultural processes. Building on a growing body of work, we examine how families experience and design together at the intersection of culture and technology. Drawing on Indigenous science and culturally sustaining/revitalizing perspectives, we investigate the ways in which families engage with culture and technology during a plant walk led by Tribal Elders that included a Tribally-designed virtual reality (re)interpretation of the experience. Insights from our findings highlight ways in which one Tribal Nation balanced culture and technology in ways that reclaimed their uses to maintain technological sovereignty and self-determination as designers.

### Objective

One persistent challenge to broadening participation in and access to STEM is that the majority of these efforts operate from the assumption that science is acultural resulting in deep epistemological tensions (Bang & Medin, 2010; Brayboy & Maughan, 2009). Not only does this ignore the cultural, historical, and political roots of science, but it also marginalizes Indigenous peoples, who take an ecological approach to science and recognize it as inextricable from culture (Aikenhead, 1997; Bang & Medin, 2010). From this stance, we argue that the perpetuation of technological disparities is rooted in (mis)representation and lack of representation of Indigenous culture, education, and science. As a result, emerging technologies do not support or engage Indigenous ways of being and knowing and often they harm, silence, or further traumatize Indigenous peoples (Litts et al., 2020).

In response and resistance, scholars push for “technological self-determination and sovereignty” (Winter & Boudreau, 2018). We further posit that *who designs* matters as it inherently determines the cultural process of design and therefore the product of what is designed. To contribute to this ongoing conversation, in this paper, we share a four-day community workshop, *Shoshone Plant Experience*, designed with the Northwestern Band of the Shoshone Nation (NWBSN) to support engagement with culture, science, and art through digital and “original technologies” (Barajas-López & Bang, 2018). Our inquiry is guided by the research question: *how do culture and technology intersect in a community workshop?* Drawing on Indigenous science and culturally sustaining/revitalizing perspectives (McCarty & Lee, 2014), we investigate the *forms of relating* to culture and technology that families engage during a plant walk led by Tribal Elders and through creating digital (re)interpretations to share with the broader Tribal community. Given the tenuous history of technology with Indigenous peoples, our goal is to understand the ways Indigenous communities relate with digital technologies.

### Perspectives

#### Indigenous Science

At the forefront of our work is Indigenous knowledge systems, science, and storywork. Indigenous knowledge systems are epistemologies rooted in science and storywork (Battiste, 2002; Brayboy, 2005). Indigenous science is a “culture-dependent collective rational perceiving of reality” (Ogawa, 1995, p. 588) often shared within communities through narrative experience and oral histories (Archibald, 2008; Kawagley, 2006). Indigenous stories frequently include narratives of origination and shared community experiences, and should be viewed as the equivalent of western theory and practices (Brayboy, 2005). In particular, storywork is the act of bringing Indigenous storytelling experiences into educational contexts (Archibald, 2008). In our work, Indigenous storywork as science is understood an inherently social process shaped by culture, history, and politics that is relationally intertwined with land and place.

## Culturally sustaining/revitalizing

We take a culturally sustaining/revitalizing approach (McCarty & Lee, 2014) to our work. Culturally sustaining/revitalizing pedagogy builds on Paris' culturally sustaining pedagogy (Paris, 2012) and focuses on understanding and conceptualizing educational practices specific to Indigenous learners. Culturally sustaining/revitalizing pedagogies are shaped by a deep recognition of Tribal sovereignty and need for decolonizing learning toward sustaining/revitalizing identities of Indigenous learners (McCarty & Lee, 2014).

## Methods

### Methodological approach

In our broader project, we adopt a community-based design research (Bang et al., 2016) approach, which consists of “design efforts that work from within the “ongoingness” of communities” (p. 11). Specifically, we take a *community-driven design research* (Litts et al., 2021) approach, a collaborative design process in which Indigenous partners maintain sovereignty as designers, to our partnership work. This methodological orientation recognizes the historical, cultural, and political nature of partnering with Indigenous communities, as well as embraces the needs for inviting community-wide, intergenerational participation and addressing systemic and historical challenges. From this stance, we take up an *intrinsic case study* (Stake, 2008) approach where we seek to understand the *Shoshone Plant Experience* itself as a case. Thus, the case is bound by the four days of the workshop. In this paper, we focus on moments where culture and technology intersect.

### Setting and participants

The NWBSN is a community of about 575 enrolled members most of whom are dispersed across urban and rural areas in Northern Utah and Southern Idaho. Historically, NWBSN are a nomadic people without a designated reservation land. We held a four-day workshop, *Shoshone Plant Experience*, which consisted of one day of exploring native plants with Tribal Elders in a local canyon and three days of developing (re)interpretations of the plants' stories using a variety of media. As part of the workshop, Tribal community members also developed a virtual reality (re)interpretation of the plant walk (see: [daigwade.org/shoshoneplants](http://daigwade.org/shoshoneplants)) to share cultural and experiential knowledge with the broader Tribal community. Family participation varied across days, but we had 20 participants throughout the workshop who consented to the research.

### Data Collection and Analysis

In this paper, we present findings from a range of qualitative data collected throughout the *Shoshone Plant Experience*. Data include fieldnotes from four researchers, audio and video recordings, design work, and semi-structured interviews throughout the workshop. Across data, we developed the *Shoshone Plant Experience* as a case by tracing the ways in which families engage culture and technology through descriptive and in-vivo coding (Saldaña, 2009). We then examined the ways in which families experienced, described, and reflected on their relationship with culture and technology in moments where they intersected. Kimmerer (2013) explains how land is woven into storywork practices: “our relationship with the land cannot heal until we hear its stories” (p. 9). It is this act of relating that frames our analyses. We share Bang and Marin's (2015) commitment to “relational epistemologies,” which is rooted in the belief that all things are “connected in dynamic, interactive, and mutually reciprocal relationships” (p. 534).

We collaboratively developed analytic insights through oral sharing and reflection in weekly meetings. Tribal Elders of the research team reviewed written accounts of these oral meaning-making sessions to establish resonance. With this collaborative meaning-making process, we collectively triangulate interpretations and claims (Creswell, 1998) across partners, perspectives, and data types.

## Findings

While analyses are ongoing, we present here three *forms of relating* (reciprocity, preservation, and experiential) with the intersection of culture and technology that families shared through the *Shoshone Plant Experience*. Analytic contributions from Tribal Elders are presented as direct quotes.

### Reciprocity of learning culture and technology

In the *Shoshone Plant Experience* workshop, we noted several demonstrations of the “mutually reciprocal relationships” (Bang & Marin, 2015) between cultural knowledge and digital technology. Tribal Elder Rios Pacheco (Author 2) unpacks how Raymond, a 13-year-old Tribal member, illustrated this relationship: “When her boy came and he came and asked you know quietly and... and I told him you know okay lets go over here and

look at these plants. So we went through and looked at them and said well we'll take this one... and I told him to watch out because of all the thorns on that plant. So we took a sample of that plant and we kept on going and then we found another one and I asked him how it felt and what it was for... so he had that contact of one-on-one. Then he turns around and when we were ready to leave, you asked if he wanted to help Jake with the drone, so now he's able to have contact with a complete circle... So what happens is we have that contact with one-on-one and then now we have this interest in technology of how he can show that one-on-one. Not just by being there in person and seeing that plant, but also using technology to see that plant 3D and see the whole valley in 3D. So that's what the future of technology is: bringing what you see in life into a better understanding to someone that doesn't have that opportunity to see it in life." (Data Analysis Meeting, 07/05/2021).

In this example, the cultural knowledge exchange between Rios and Raymond prompted Raymond to craft a (re)interpretation using virtual reality technologies, which in turn prompted deeper exploration of cultural knowledge and so forth. We found that families who attended the in-person plant walk experienced the plants and learned about their uses and then re-experienced that learning in their interpretations with digital technologies.

### Preservation of culture with technology

Through the *Shoshone Plant Experience* workshop, families expanded the ways in which culture can be preserved with and through technology, especially as designers. Family participants who continued with the three workshop days at the Tribal Offices, developed their own interpretations of cultural knowledge that they learned on the plant walk. These took the form of digital stories or movies, informational graphics or videos, and more. Tribal Elder Patty Timbimboo-Madsen (Author 3) reflects on the impact of developing these interpretations: "... to me in the end, I can see it giving us an easier way for preservation to retain the information and to be able to pass that on to the people of the Tribe. It's in our words and through our eyes and to me it's a gift giving back to the people of the Tribe" (Data Analysis Meeting, 07/08/2021). Building on this point, Tribal Elder Gwen Davis (Author 4) contributes, "Well technology is something that we have to embrace, because it's here... I believe it's going to be a way in which we learn how to use it to preserve ourselves, whether it's our culture or whether it's how we learn how to do things. It's a way of teaching..." (Data Analysis Meeting, 07/08/2021).

Moreover, when considering the traditional oral ways of preserving culture, Tribal Elders grappled with the tradeoffs of using technology for cultural preservation. Patty explained, "Oral histories are good because you can tell it anyway you want. Is there a wrong way or a right way? But once it's cemented on paper, or on a computer or on a tape or whatever, it's more permanent instead of trying to make the story up again. I think any time you try to elaborate it more or make it more funny or add your two cents to it, it kind of changes." (Data Analysis Meeting, 07/08/2021).

Rios further expounds, "Yeah I don't think technology is going to change anything, it's just like oral history. You carry on what you heard, but you also have that opportunity to add to it and you have the opportunity to take away from it. Same way with technology. You're not going to say everything word for word, because you have the capability of changing those words... The only ones that will stay the same are the ones that are true to what they're saying and what they want to convey... But [technology is] also good, because you can have a thought and it [moves] all the way throughout the world. But your oral thought can only be conveyed with that small group that's around you. That's the big difference."

### Experiencing culture through technology

Using virtual reality to recreate the *Shoshone Plant Experience* is aligned with how the Tribe hopes to use technology to preserve and share culture, yet it does have limitations in the relationship between their storywork and the land. Tribal Member Alicia Martinez (Author 6) describes the loss of human essence as a limitation of this technology stating, "I don't know I mean just even technology itself, separate from culture, you know I think one of some of the complaints, maybe or the criticism of it is the loss of the human essence" (Data Analysis Meeting, 07/05/2021). She further argues that we need to restore the human/more than human essence by maintaining space for the relational connections between technology, culture, and the land. Curiously, we did note all of this woven together in one key moment, which we share here as an illustrative example.

The use of this technology was initially a pragmatic solution to engage people who could not participate on the workshop days, which became one of its key affordances. During the three design workshop days, NWBSN community members put on Oculus Go headsets to view the VR footage we captured from the plant walk day. This became an intergenerational learning experience where Ruby, a 10-year-old Tribal Member, quickly became the go-to teacher for how to use the Oculus Go. In exchange, many of the NWBSN community members immediately began sharing stories and memories based on what they viewed through the headset. For example, Garry, a Tribal Leader, exclaimed, "Oh whoa... Holy Moly!!... That is awesome!" Once oriented to the Oculus Go, he began sharing his own cultural knowledge and stories based on what he saw in the virtual canyon as if we

were all standing there together. In addition to providing insights for how the intersection of culture and technology facilitated Elder-youth interactions and exchanges of knowledge, this example also demonstrates the unique affordance of experiential or immersive technologies in prompting deepening and furthering of relational sharing of cultural knowledge. This also reinforces the *reciprocity* of culture and technology previously discussed.

## Insights & Significance

Insights from our findings highlight three forms of relations (reciprocity, preservation, and experiential) that the NWBSN community engaged with at the intersection of culture and technology. These forms of relations were illustrative of the collective move in the community to reclaim their uses of technology by maintaining technological sovereignty and self-determination as designers (Winter & Boudreau, 2018). Specifically, the reciprocal relationships that emerged in the *Shoshone Plant Experience* workshop sheds light on how Indigenous communities can build new relationships with technology when maintaining sovereignty and self-determination over their engagement with it. To this end, as we continue to grapple with the early findings of our work, we persistently wonder about the significant and complex role of *land* in our work, particular for the NWBSN. Our work builds on and contributes to existing efforts to center Indigenous science and culture and expand current notions of *who* counts as designers of technology.

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