Connecting Space and Narrative in Culturally Responsive Making in ARIS with Indigenous Youth

Short Paper†

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ABSTRACT

Attending to issues of equity in making[1] demands that we work closely with communities, focusing on what it is made, how it is made, for whom, and in what contexts. Rather than exploring making exclusively as a pathway to STEM learning, we examine how Indigenous youth learned about and documented community-based making using the Augmented Reality and Interactive Storytelling (ARIS) platform. Drawing on a range of qualitative data, we asked: (1) What did youth learn about makers, materials, and cultural meanings in their community? (2) What were the making processes of small groups of Native American youth tasked with developing games located in their community? Findings highlight how Indigenous youth learned about and incorporated cultural knowledge into their ARIS games. In the discussion, we address how beginning and ending with community-based making contributes to ongoing discussions about culturally responsive making and what others might learn from our experiences.

CCS CONCEPTS

• **Social and professional topics→ Computer science education**; computational thinking; K-12 education

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KEYWORDS

Culturally responsive making, place-based education; codesign; ARIS

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1 INTRODUCTION AND BACKGROUND

The increasing affordability of digital fabrication tools and software has led many to tout the democratizing potential of the Maker Movement [3], but critics argue that mainstream conceptualizations of making in the United States are fundamentally White, male, and middle class [4, 14]. Dominant discourses in the Maker Movement [5] emphasize entrepreneurship, workforce development, and exploration with high-tech tools at the expense of the kinds of everyday, purposeful making that exist, and are often a necessity, in nondominant communities. In order to realize the democratizing potential of making, we must turn a critical lens on the ways in which culture and power shape our conceptualizations of makers, making, and makerspaces. Attending to issues of equity in making demands that we work closely with communities, with a particular focus on what it is made, how it is made, for whom, and in what contexts.

Culturally responsive making [12] grew out of the work on culturally responsive computing [10] and is aligned with efforts to promote equitable, sustainable making [14]. Culturally responsive making draws upon the cultural knowledge and making practices embedded in the daily lives of particular communities. Because place and culture are closely intertwined, place-consciousness and space-making have emerged as valuable

ways to engage youth from nondominant communities in making. Particular landscapes are connected to particular ways of knowing, being, and valuing in the world [1]. Thus, place is not only a geographical location, but also a way of (re)connecting with individual and communal identities [2, 7, 8, 10]. Youth also make space for themselves within dominant narratives of making and STEM by constructing physical and digital artifacts [4, 11].

Drawing on this prior work on space- and narrative-based pedagogies, we investigated how culturally responsive making could be both a context for learning about the space makers, materials, and meanings occupy in their community and a context for youth to make their own stories about their community. We present case studies of two small groups of Native American youth (ages 12-14) in the Southwestern United States who created interactive digital games connected to significant places in their community. These narratives were created using the Augmented Reality and Interactive Storytelling (ARIS) platform [9]. Through the two case studies presented here, we explore youths' making processes, with a particular focus on how they negotiated the translation of cultural elements, such as stories, into a digital platform. Specifically, we asked: (1) What did youth learn about makers, materials, and cultural meanings in their community? (2) What were the making processes of small groups of Native American youth tasked with developing games located in their community? In the discussion, we address how beginning and ending with community-based making, rather than using community-based making as an entry point into STEM, contributes to ongoing discussions about culturally responsive making and what others might learn from our experiences.

2 CONTEXT

Our research takes place in a relatively small Native American community (10,000 members) in the Southwest. Working with staff from the community's education, cultural resources, and public relations departments, as well as staff from the American Indian program at the community college that hosts the summer camp, we co-designed an activity in which youth visited a series of significant artistic and economic development sites in their community, and then used the ARIS platform to make games located in these places that could be played on a mobile device. Ultimately, the goal is that these games will become something that the community's public relations department can use to share information with visitors to the community. Thirty-Eight Native American youth (12-14 years-old), including 23 females and 15 males, participated in the activity. Youth were randomly divided into 15 small groups of 2-4 students each, with 5 groups focusing on each set of locations.

Over the course of the two-week camp, the ARIS workshop met on seven days, with each day consisting of 1-2 sessions of 1-2 hours each. After a project introduction on day 1, youth visited the specified community locations on day 2 to document each site. On day 3, youth engaged in a paper and pencil storyboarding process (Fig 2). During workshop sessions on days 4-7, the focus was on youth building their games in the ARIS editor by translating their storyboard into digital form.

3 DATA COLLECTION AND ANALYSIS

We collected a range of qualitative data with a focus on understanding (1) what youth learned about makers, materials, and cultural meanings in their community and (2) youths' making processes. Data sources include fieldnotes, final reflective interviews with youth, photographs of the groups' making processes, and artifacts produced by each group, such as their storyboards and screenshots of their in-process and completed games. We focus on case studies [13] of groups 2 and 4, whose members participated in a tour of seven sculptures located throughout the community with the sculptor, Jerry, as their tour guide. Group 2 consisted of 3 girls, Melissa, Carey, and Julia, while Group 4 consisted of two girls and one boy, Veronica, Grace, and Adam. We chose to focus on these two case study groups because the content of the sculpture tour was the most closely linked to community ways of knowing and being. Many of the sculptures youth visited represented community stories.

Figure 1: Two girls work on building their game in ARIS.

4 FINDINGS

In each case study group, group members were concerned with making sure that what they represented about community culture resonated with "the facts" and also that the knowledge would be shared with others, mostly community members. Here, we examine how they collected stories and then made their own games that incorporated those stories.

4.1 Collecting Stories About Makers, Materials, and Meanings

The documentation process focused youths' attention on things they often passed by without seeing or understanding, reminding us of the ways in which place calls our attention to culturally-organized ways of knowing, being, and valuing. As Carey, a member of Group 2 noted, she had visited the place where a series of four basket sculptures were located, a local government building, many times, but she didn't know about the

sculptures prior to the tour. As she stated in an interview, "I didn't really see them or notice them" (6/15/17). Similarly, Veronica, a member of Group 4, was excited by the cultural knowledge Jerry shared. She reflected:

> When he started telling me all the facts about [the sculptures], I kinda thought it was pretty cool and I didn't know we were going to make a game…I kind of just figured, that's cool, maybe I should put this into something where it would be useful to other people to learn about our tradition and our tribe and stuff (Int., 6/15/17).

In this reflection, Veronica makes clear that the cultural knowledge shared by Jerry and embodied by his sculptures played a critical role in her desire to create a vehicle for sharing that knowledge with others.

During the sculpture tour on day 2, Jerry spoke to youth about how his sculptures represent "the things most important to the people a long time ago" (Audio Recording, 6/6/17) and the stories represented by each of the sculptures they visited. He also spoke at length about his creative processes, including explicit details about the construction and materials for each piece. Groups 2 and 4 documented the information shared by Jerry and the sculptures themselves, with group 2 making extensive use of the brainstorming worksheet to take notes. In contrast, Group 4 answered only a quarter of the questions on the brainstorming worksheet using single, incomplete sentences, but Veronica later noted that she committed a lot of "the facts" to memory (Int., 6/15/17). In addition to written notes, both groups documented the tour through photographs, Group 2 took almost a hundred photos and Group 4 captured forty-five images.

4.2 Making Community Stories in ARIS

Though both groups initially struggled with coming up with an idea for their game, final reflective interviews with 5/6 group members (Adam was absent on both interview days) from the two case study groups highlight that translating their ideas into ARIS was the most challenging part of the project. Melissa from Group 2 observed that it was "very confusing" to put things into ARIS and summed it up by saying, "I guess we didn't ask enough questions" (Int., 6/15/17). For instance, Julia, who did most of the programming for Group 2, noted that figuring out how to use locks, a way to sequence content within a game so that the player doesn't see everything all at once, was something her group needed research team help to figure out.

Both field notes and final reflective interviews with group members document an initial struggle to develop an idea for their interactive tour/game, with Melissa from Group 2 noting that her group was just "really stuck" before she came up with the idea that became their game, centering around four characters each looking for the materials to construct one of Jerry's sculptures (Int., 6/15/17). However, once each group had an idea, group members noted that storyboarding was the easiest part of the process, with the cards serving as a memory device between what was in their heads and what they needed to put in the ARIS editor. As Julia from Group 2 noted, "They helped us organize our ideas and where we wanted things to go" (Int., 6/15/17). After the introductory storyboarding session, Groups 2 and 4 each had a preliminary sequence of storyboarding cards. Group 2 had eight storyboarding cards, referencing four different characters, one sculpture 'quest', and three material 'items' players must acquire. Group 4 had five cards introducing the narrator and Jerry, as well as three sculpture 'items.' In subsequent sessions, the groups added 'item', 'plaque', and 'quest' storyboarding cards to guide players to different materials and locations. When asked why they chose specific pieces, Veronica and Grace from Group 4 both noted that they chose the "important" sculptures, with Veronica elaborating that they chose sculptures with more cultural significance that other people might not know about. For instance, in referencing a sculpture of a plant, Veronica noted that most people "just think it hurts you" and don't know that it is used in basket making. She noted, however, that she was aware of how the plant was used because, "my grandma uses it" (Int., 6/15/17).

Figure 2: Storyboarding cards completed by Group 2 highlight oil paint and a torch, materials used by sculptor Jerry, as items that must be found (green cards).

The members of Group 2 described a more collaborative approach and discussion among their group members to determine which sculptures to include. In particular, Group 2 asked for clarification about what types of materials Jerry used for his pieces, and he spoke with both groups on Day 6 to answer additional questions. Julia explained that Jerry "answered all of our questions and we were able to figure out what we wanted to do with the rest of the game" (Interview, 6/13). Prior to this visit, Group 2's storyboard was rather incomplete with few details about the necessary material 'items.' However, their final storyboard demonstrates Jerry's insight; four different character quests with specific descriptions of the required materials players must find to hear Jerry's narratives are outlined. As Julia noted, "Getting [Jerry's] approval made us more excited about our game" (Int., 6/15/17). Overall, members from both groups expressed excitement and pride to share their games with others. Veronica reflected that "it's cool to teach people that don't know a lot" and noted that "this stuff," referring to cultural knowledge, "is going dead" (Int., 6/15/17).

Groups 2 and 4 ultimately developed similarly themed interactive tours/games, described by Group 2 as an "adventure" to acquire the materials associated with making each sculpture and by Group 4 as a scavenger hunt to locate the sculptures within the community. For group 2, focusing on the materials was an attempt to distinguish themselves from other groups (Int., 6/14/17). As group member Julia described, "In our game…there's a character and they have to go look for the materials that the artist used for that individual art piece and after they get those materials, them they get to hear the story behind the art piece and how it was made and things like that" (Int., 6/15/17). Similarly, the introductory conversation in ARIS for group 4's game reads, "Hello, we are the creators of this game. You will be going on a scavenger hunt with Jerry. You will be looking for items and collecting them." In both games, completing a quest successfully enables one to hear the story behind each sculpture, which Jerry shared during the sculpture tour and later elaborated on during a visit to the camp. For instance, both groups make reference to a creation narrative that Jerry described as linked to a series of four basket sculptures, each representing a significant aspect of the community's creation story. In these ways, youth highlighted the making practices of their community through their own game making practices.

5 DISCUSSION

Culturally responsive making often begins with the premise that we can engage youth from nondominant communities in science, technology, engineering, and math (STEM) through cultural content, such as learning to make e-textiles based on local flora and fauna as a gateway to computational thinking [12] or learning to make Shoshone-inspired beadwork on a virtual loom as a way of improving understanding of the Cartesian Coordinate system [6]. At their best, such activities are about STEM and culture, but many times culture is simply a hook to reel youth into STEM learning. What happens when we shift the focus of culturally responsive making to focus primarily on making meaning with communities?

Like other scholars [1,2,4,11], we found that place-based and narrative-based frameworks provided an especially promising approach to culturally responsive making because of the ways in which they helped us to draw youths' attention to the ways of being, knowing, and valuing that are often difficult to see and articulate. As the case studies of groups 2 and 4 demonstrate, youth took their roles as documenters and sharers of community making practices and the meanings behind them very seriously. As Veronica emphasized in her interview, "the facts" were crucial and both groups followed up with Jerry, the sculptor, during his visit to the camp to make sure they were sharing correct information through their games. Jerry's sculptures brought community stories and making practices to life for youth. In the process of locating Jerry's sculptures on the map in ARIS and retelling the stories associated with his sculptures, students also located themselves in community and cultural context. Further, we take youths' obsession with "the facts" they learned as a sign of the great responsibility they felt for the content they were curating. Indeed, Jerry's translations of community stories into sculptures and the youths' translations of sculptures into games highlight the simultaneously fixed and fluid nature of culture and cultural knowledge.

We noted that students struggled at several phases of documenting and making the sculptures. First, as Veronica noted in her reflective interview, many youth were uncertain about what exactly they would be making when they went out to visit and document Jerry's sculptures. Second, upon return to camp, youth struggled with idea generation. In future iterations, we will investigate whether or not further design constraints and additional time exploring ARIS before engaging in documentation support youth's making processes more fully.

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REFERENCES

[1] Megan Bang, Lawrence Curley, Adam Kessel, Ananda Marin, Eli Suzukovich, and George Strack. 2014. Muskrat theories, tobacco in the streets, and living Chicago as Indigenous land. *Environmental Education Research,* 20(1), 37-55. DOI: http://dx.doi.org/10.1080/13504622.2013.865113

[2] Megan Bang, Ananda Marin, Lori Faber, and Eli Suzokovich,III. 2013. Repatriating Indigenous technologies is an urban Indian community. *Urban Education, 48*(5), 705-733

[3] Paulo Blikstein. 2013. Digital fabrication and "making" in education: The democratization of invention. In J. Walter-Herrmann & C. Buching (Eds.), *FabLabs: Of machines, makers and inventors.* Bielefeld, Germany: Transcript.

[4] Angela Calabrese Barton and Edna Tan. (2016). Mobilities of criticality: Space-making, identity and agency in youth-centered makerspaces. Submitted to Cognition and Instruction, July 2016

[5] Dale Dougherty. 2011. *Dale Dougherty: We Are Makers* [video file]. Retrieved from https://www.ted.com/talks/dale_dougherty_we_are_makers

[6] Ron Eglash, Juan Gilbert, and Ellen Foster. 2013. Broadening participation: Toward culturally responsive computing education. *Communications of the ACM, 56*, 7 (July 2013), 33-36. DOI: http://dx.doi.org/10.1145/2483852.2483864

[7] David A. Gruenewald. 2003. The best of both worlds: A critical pedagogy of place. *Educational Researcher*, *32*(4), 3-12.

[8] Katie Headrick Taylor and Rogers Hall.. 2013. Counter-mapping the neighborhood on bicycles: Mobilizing youth to reimagine the city. *Technology, Knoweldge, and Learning*. DOI 10.1007/s10758-013-9201-5

[9] Chris L. Holden, David J. Gagnon, Breanne K. Litts, and Garrettt Smith. 2014. Reality Experimentation. In *Technology Platform Innovations and Forthcoming Trends in Ubiquitous Learning* (pp. 19-34). IGI Global.

[10] Breanne K. Litts, Garrett W. Smith., David J. Gagnon, John Martin, and Jim Mathews. 2013. Situated Learning and Mobile Technologies: Connecting Theory to Design. In the *Proceedings of the Ninth Annual Games, Learning, Society Conference (pp.210-215). ETC Press: Pittsburgh, PA*.

[11] Nichole Pinkard, Sheena Erete, Caitlin Martin, and Maxine McKinney de Royston. 2017. Digital Youth Divas: Exploring Narrative-Driven Curriculum to Spark Middle School Girl's Interest in Computational Activities. In *Special Edition of Journal of the Learning Sciences.*

[12] Kristin A. Searle and Yasmin B. Kafai. 2015. Boys' Needlework: Understanding Gendered and Indigenous Perspectives on Computing and Crafting with Electronic Textiles. In *Proceedings of the eleventh annual International Conference on International Computing Education Research*, 31–39. Retrieved November 10, 2015 from http://dl.acm.org/citation.cfm?id=2787724

[13] Robert E. Stake. 1995. *The art of case study research.* SAGE Publications, Thousand Oaks, CA.

[14] Shirin Vossoughi, Paula Hooper, and Meg Escude. 2016. Making through the lens of culture and power: Towards transformative visions for educational equity. *Harvard Educational Review, 86*(2), 206-232.