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A World-Making Lens Towards Relational Understandings of Data

Heather Killen (Chair), Institute for Learning Sciences, University at Buffalo, hkillen@buffalo.edu
Samuel T. Arnold, University of Illinois Chicago, Sarnol4@uic.edu
Vien Nguyen, Northwestern University, viennguyen2026@u.northwestern.edu
Ashley Quiterio, Northwestern University, ashleyquiterio2027@u.northwestern.edu
Trang C. Tran, University of Alaska Anchorage, tctran@alaska.edu
Ashieda McKoy, University of Colorado Boulder, Ashieda.Mckoy@colorado.edu
RaeSheena Kennedy, KIPP Columbus, raesheena.u.kennedy@gmail.com
Iris Tabak (Discussant), Ben-Gurion University of the Negev, itabak@bgu.ac.il

Abstract: World-making has not been commonly considered in data science education. We were inspired to explore how a lens of world-making might deepen and expand our relational understandings of data. We are scholars working in diverse contexts united by a broad interpretation of what data is and can be. By entering a collaborative, sustained dialog, grounded within and across our research projects, we recognized that adopting a world-making lens supported us to envision the now and future more pluralistically and agentically by recognizing the multidimensional, multifaceted world(s) present in our research. Exploring world-making prompted explication and clarification of obscured relations, pointed to bridges across worlds, and surfaced assumptions about worlds. We convene this symposium to share how world-making operated in our work and to invite symposium attendees to take up these approaches in positioning data and data science education in service of greater societal and global goals.

Symposium overview

We are a group of doctoral students, doctoral candidates, and early career scholars who work across multiple universities within the United States (U.S.) and are interested in exploring new contexts for critical data literacies. We built an alliance after meeting within various learning sciences spaces, including the Learning Sciences Graduate Student Conference, the learning sciences special interest group at the American Educational Research Association conference, and the International Conference of the Learning Sciences. We draw support from each other as we engage in work that critically explores how data functions in sociocultural spaces inside and outside of classrooms, and within both youth and adult communities. The 2025 ISLS conference theme, Educating for World-Making, sparked a conversation that prompted us to explore what world-making with data meant to us, how the role of world-making manifested in our varied research contexts, and how we might collaboratively envision the outlines of an expanded future world of data science education we could contribute to.

Our conversations highlighted the importance of data literacy in our social world, empowering citizens to critically examine sociopolitical dynamics, challenges, and consequences of data in ongoing sensemaking and decision-making processes (Irgens et al., 2020; Wise, 2020). We grounded our conversation in literature, discussing the growing political implications of data usage within current sociopolitical landscapes, e.g., how Benjamin (2019), Noble (2019), and O'Neil (2017) interrogate the ideologies and practices often prized in data science education, exposing their historical roots in dominant discourses, and how a growing emphasis within STEM disciplines have shaped educational initiatives over the past few decades (Takeuchi and Marin, 2022; Vossoughi, and Vakil, 2018;). We aligned ourselves with D'Ignazio and Klein's (2020) complication of the claim of "neutral and objective" data, specifically identifying social constructs, labor, bias, and power relations inherent in both producing and using data. Through the lens of data feminism, we deliberated how "context is essential for conducting accurate, ethical analysis" (D'Ignazio & Klein, 2020, p. 149), and how "...context can provide support for conceptual growth or sustained interest" (Lee et al., 2022, p. 1108). Our conversations worked to extend this research of critical data literacies to consider a lens of world-making with data.

We found world-making with data a valuable lens to assess our research. Throughout our iterative, collaborative inquiry processes into world-making, we agreed on the following commitments to explore world-making in our work within the broader world of data science education:

- The term data should be interpreted broadly. Data might take a traditional form of statistics or a more expanded form that might otherwise be thought of as personally or community held knowledge.
- Data of all sorts can be powerful tools for envisioning the now and future more pluralistically and agentically.
- All world-making can be a continuous, ongoing process that happens in the now to shape both the near and far future.

In Killen, Arnold, Nguyen, and Quiterio's research, world-making with data happens in informal learning spaces. Killen supports her participants to visualize aspects of their local world, and the community-held data that they have collectively agreed upon, in an online, public map. Arnold examines the collaborative aspect of world-making by investigating how math educators jointly work with researchers to improve problems of practice. Nguyen shares how a family embarks on an electric vehicle road trip using data to reconcile local and global worlds to "come down to earth." Quiterio uses the lens of world-making to expand the ways data science is represented to engage youth in the personal data around them that they hold, use, and produce. Tran and colleagues bring world-making with data into classrooms, exploring how a facilitated environment for interactions and learning within a U.S. middle school class uses world-making with data to foster student identity, agency, and advocacy. Despite these differences in context, participant group, and project goals, our research is united in the aim to use worldmaking to foster a more sustainable, just, harmonious world or worlds (NASEM, 2024).

Having recognized both the opportunities and challenges of cultivating critical data literacies and how data might engender powerful pathways to knowledge making and world-making, we wish to convene this hybrid symposium to share how we view our work as being a part of, adjacent to, or beyond directions currently foregrounded in data science education. In this symposium we aim to sharpen our thinking about how a lens of world-making with data might guide a possible future of data science education. Using our varied research contexts and findings about the role of data in learning as points of exploration, we look forward to deliberating with attendees over the following two questions:

RQ1: How might using a world-making lens deepen and expand our data-focused research and understanding?

RQ2: What greater contribution to data science education might adopting a world-making with data lens allow?

With these questions we hope to create space at ISLS 2025 for a deliberative discussion on how perspectives on world-making with data may extend the field of data science education beyond its rare presence in ongoing databases (Concord Consortium, 2024). Success would be facilitating and sparking dialogue that *strengthens relational understandings of data*, including a move away from static and fixed approaches and toward a considering and understanding of data as contextually and dynamically situated (Radinsky, 2020), while exploring relations between and across data structures (Wilkerson & Polman, 2020). We aim to engage with the ISLS community in consideration of the role world-making with data might have when reconsidering and reauthoring, integrating and centering, critical voices and explanations in the future of data science education.

Our 90-minute, hybrid symposium will first allow us to introduce how our research builds worlds with data. The bulk of the symposium will be devoted to a structured deliberation of what an expanded future for data science education might look like. Symposium participants will be active agents as we ask attendees to, in small groups, think about opportunities that a world-making lens might allow in their both their own work and in data literacy education. In the final 10 minutes, our discussant, Dr. Iris Tabak, a scholar engaged with data literacy research and development for more than a decade, will provide a synthesis of themes across the five projects and attendee discussion, centering understandings of what taking a world-making perspective within data science education might look like and how such a stance might expand the discipline for greater societal and global impact.

Resident mapping of community-held data: Developing local knowledge into local data to bridge the locally known to the scientifically known

Heather Killen

Adopting a world-making with data lens provided a vehicle for clarifying aspects of the multi-dimensional world inhabited by rural, coastal, conservative-leaning U.S. participants in my participatory map-making research project. I aimed to support residents to see how their landscape was connected to the socio-cultural + scientific challenges of anthropogenic climate change. I targeted the following as I explored how community members might be active, transformative agents within their community when meeting climate change challenges (Chadwick, 2015; Guldi 2021; Clegg et al., 2019):

1. Concretizing the scientific challenges of climate change in a way that is manageable and familiar by connecting local landscape knowledge of changing natural conditions to global climate change.
2. Supporting residents to meet the socio-cultural challenges of local climate change through a framework to interrogate local landscape observations and collaboratively elevate local knowledge to the level of community data.
3. Elevating a community's valuable local data to engage with and expand scientific climate data by designing technological tools, or new uses for existing tools, that put locally held and scientifically held data in the same civic conversation.

I present my findings regarding how community members used collaborative map making in the form of ArcGIS StoryMap software to make aspects of their world visible. I found that this process was valuable to the participants in a variety of ways while allowing for me, as an outsider to the community, to gain insight into what local data residents held and valued in their world. I will share how residents carefully framed the local knowledge of climate to avoid aggravating political tensions in their world, and how this framing created challenges for putting community held climate data in conversation with state and national climate data.

I engaged a small (population of 6,366 in 2022) rural town along the Chesapeake Bay. As determined by the 2022 US Census, 76% of residents reported being white and 11% of residents reported being Black or African American (US Census Bureau, 2022). In the 2024 presidential election, the Republican candidate received 54.2% of votes within the town's county (The State Board of Elections, 2024). The town was low lying, averaging 49 feet above sea level, with a great deal of development directly on or near the shore of a large bay. Six participants were recruited via coordination with a community partner, a pastor, and through snowball recruitment. All six participants self-identified as white women over the age of 50. All reported living in the area for 10+ years. I held a total of six design sessions of 2.5 hours in the early evening at a centrally located, well-known local community center. Sessions followed the five stages of design (Dam & Siang, 2021). Community material and member check interview analysis involved multiple rounds of focused and inductive coding (Saldaña, 2021).

I analyzed three sources of community-based climate data that participants brought into the design space: the town's five-year planning document, entitled Coastal Resiliency Plan; a YouTube video of a well-known and well-respected resident giving a community lecture sponsored by the area historical museum, entitled "Sinking Lands and Rising Seas;" and a recently published book by a local resident and professional geographer, entitled Icy Winters on the Chesapeake Bay, A History. My analysis determined that all, by and large, presented a scientifically accurate recounting of the rising waters, increased flooding, sinking lands, and warming climate that is the direct local result of anthropogenic climate change. However, all three sources of local climate knowledge also studiously avoided mentioning the term "climate change." For example, the town's planning document, in 54 pages, mentioned the term only four times, all in reference to the titles of state commissions or state documents.

Within the design sessions, participants did explicitly discuss climate change. I also determined through survey results that most participants were not skeptical of climate change. However, participants collectively chose not to include any explicit climate change related community data within their final map. When I asked about this during post-experience member check interviews, two participants shared their view that even if their map didn't explicitly include data about climate change, residents of their community, as map users, should be able to connect the map data to climate change. This was in reference to a waypoint that indicated a pond that had been a traditional skating spot for the community but now rarely froze. I asked participants if they avoided including local climate change knowledge on their map because they were afraid it might be objectionable to their fellow residents. They rejected this suggestion, but did discuss self-censoring in other community spaces. When probed, participants shared how they struggled with their knowledge of the topic. One participant explained, "I think that climate change is a much harder thing to get everyday people to step up and volunteer and say they're gonna think about. That's a lot of thinking, you know?" Later the same participant clarified, "The [climate change] knowledge wasn't immediately there in my head."

Appling a lens of world-making with data supported me to see these findings with a new perspective. In working so hard to avoid the term "climate change," the community, reflected in the local climate data sources, was upholding an aspect of local world building - that climate change was a term this community did not use, even when explicitly talking about local climate data. Residents recognized this world-making norm, and although they didn't report feeling constrained by it, they did reflect the constraint on their map by choosing to not include any explicit discussion of climate change. Further, participants reported struggling with parsing climate change within their local context. A world-making with data lens points to an answer for why this might be. Within the community, there is no local "climate change" data, only data on resiliency. It is difficult to develop a deeper understanding of local landscape and the connections it might hold to the larger socio-cultural challenge of climate change when there is no shared data or discourse between the locally known and the scientifically known.

World-making with data: How math educators collectively make sense of data in a research-practice partnership

Samuel T. Arnold

This paper explores world-making with data in the context of a research-practice partnership (RPP) that aims to improve the learning and teaching of mathematics in elementary schools. In education, RPPs bring together educators and researchers of differing expertise to jointly engage in research aimed at creating effective and sustainable improvements. These long-term collaborations are defined by their focus on problems of practice and

their use of data (Coburn & Penuel, 2016). In the context of this study, researchers and district staff work together to engage in cycles of inquiry in which the collection and use of data drove the problem identification process and the evaluation of improvement strategies.

World-making with data in the context of this RPP related to how educators and researchers collectively use data to move toward their goal of improving math education. In partnerships, the use of data is deliberate and oriented toward actionable changes that bring about a desired future and involves collectively making sense of possible futures from discussions on data. Given the local and global imperative for schools to make data-driven decisions, the use of data involves many different factors across organizational and political landscapes (Coburn & Turner, 2011). Partnerships can help deepen our understanding of this landscape because they are a space in which actors who represent different aspects of schooling (i.e., teachers, administrators, district leaders, researchers) negotiate the meaning and future trajectory of the group as they enact improvement strategies. To that end, this paper seeks to explore how partners engaged in an RPP used data toward improving math education.

The data for this study was drawn from a larger project aimed at improving math teaching and learning across teachers, schools, and districts through the design and implementation of district math leadership teams (DMLTs). The primary sources of data for this study are the DMLT meetings held by a specific district that has been engaged in the inquiry cycle for over 4 years. This study focused on DMLT meetings in which data-driven decisions were present. This process entailed any instance in which data were the driving force for the decisions the group made during a meeting. Once identified, meetings were analyzed using a list of *a priori* codes derived from research on data narratives (Radinsky, 2020). Codes were refined through several rounds of coding (Saldaña, 2021), and analytic memos were used to provide descriptions of each meeting and to enrich the analytic process.

Initial findings suggest that narratives with data played an important role in the collective sensemaking of the DMLT. For instance, narratives were frequently used in response to requests to interpret presented data. These often took the form of representing the educator and their colleagues or students in the data they were tasked with examining, and when shared, these stories offered jumping-in points for other educators to share similar or contrasting stories of their experiences. It was through this sharing of stories that potential futures for the DMLT were negotiated. For example, the DMLT decided to design a professional development program when a discussion of assessment data revealed that many of the educators had similar experiences implementing math tasks in their classrooms. Furthermore, the wide range of roles represented in the DMLT meetings were reflected in the stories that were told. Teachers often talked about the students in their classrooms while administrators often talked about teachers or students they've observed. These different perspectives were valuable in that people who were not physically present in the meeting were represented in ways that directed the group's consideration when deciding next steps.

This study explores how educators and researchers in an RPP engaged in world-making through their collaborative data use aimed at improving math learning and teaching. The analysis of DMLT discussions reveals how shared narratives from data-driven conversations bring into existence the future direction of the DMLT. By fostering an environment where diverse voices contribute to the shared narrative, RPPs can create meaningful change that resonates across classrooms, schools, and districts.

Embarking on an electric vehicle road trip: A case of using data to come "down to earth"

Vien Nguyen

This is a case study of an adult who planned and executed a road trip vacation with an electric vehicle (EV). I examine the case for ways that the adult grappling with "coming down to earth," following a book by the late sociologist Bruno Latour (2018). In the book, Latour wrote about the yearning for a common inhabitable earthly home. He wrote about several attractors, the modern global that is now out of reach, the local that people subsequently seek to return to, and the 'out-of-this-world' as exemplified by Brexit. He worked to develop a concept that he called the "terrestrial" as a way to inhabit, at the same time, the global and the local. My way of responding to this conference's call to consider "worlds" is to examine the "terrestrial" in my case study.

The data source represented here draws from a broader corpus of research about civic data science at a non-profit in a large midwestern city that I call Gotham. The data source is a 2024 text weblog that one professional data scientist, named Apollo, wrote regarding his experience using his EV for a road trip vacation to a rural part of the midwestern state. My analytic approach was to read the weblog closely for ways in which Apollo used data as a vehicle to inhabit both the local and the global at the same time, i.e., the terrestrial.

In his weblog, Apollo used data to negotiate the local and the global aspects the road trip. He recognized that for many persons what makes sense is not full electric cars but hybrids. He weighed questions of EV market expansion against questions of access to food through grocery stores. Apollo considered the tradeoffs between

"modern" experiences using applications for charging against the question of sharing data with brokers. Apollo considered the politics of the kinds of charging stations (PlugShare and the Tesla supercharger networks), as well as multiple types of chargers (like Electrify America, ChargePoint, or EVgo), and their translations between voltages and amounts of power.

This case study shows how one adult planned and executed an EV road trip. The adult held two opposing views of electric vehicles; one was the global, modern, forward-marching world of electric vehicles, an inevitable "mature" economic market commonly advanced by popular technology magazine articles and promoted by EV manufacturers; the other was the local. Rather than envision a utopian and modern EV world, Apollo grappled with the tensions throughout his experiment with his EV road trip. That is, Apollo worked to stay "down to earth".

Data decisions: World-making by designing for data collection

Ashley Quiterio

In this work, I explore activities that are situated in embodied experiences with sports, through which youth develop new understandings of their and their peer's movement in data. By building on prior knowledge and situating data in its context, there are opportunities for learners to practice critical approaches to data that empower them and center their agency. For example, within data generation, people can be data producers, where the relationship implies an active and conscious exchange between people and data (Hardy et al., 2020). This is different from positioning people as data givers or collectors, which is a more passive exchange that implies the information existed outside of the context of people (Hardy et al., 2020). By focusing on active relationships, learners gain a new understanding of data, and they can bridge ideas between different worlds or perspectives on "truth," which is part of the ongoing conversation about how to teach critical data literacies.

My analysis is part of larger work investigating learning about data practices within a sports technology context. Prior work at the intersection of learning sports-data practices draws on multiple settings, such as K-12 out-of-school implementations that incorporate culturally responsive pedagogy at the intersection of sports and computing to motivate learning about data practices (Drazan et al., 2017; Jones et al., 2020). Related to these cases, university settings emphasize how relationships with coaches, the sport, and sports institutions shape the perception of data practices (Clegg et al., 2023). Relational dimensions of learning about sports technologies create a foundation for understanding the ongoing world-making done by youth, and it opens the opportunity for us to explore what data offers this continuous process. Our case presents findings from a six-week summer program within a large city in the Midwest of the U.S. Youth ranged from 13 to 15 years old.

Across the sessions, activities with the sports technologies emphasized the presence, creation, use, and interpretation of data. Broadly, each section was motivated by how the intersection of sports and technology could support youth in learning about their own sports play and movement in their daily lives. In the final two weeks, youth developed their own sports technologies in small groups or individually, where one version of their design focused on data collection. I investigated how data interactions with sports technologies supported youth sensemaking about a datafied sports-world, and how – by making the generation and collection of data visible throughout the activities – they might better understand data collection processes in their everyday lives.

Through a smart jump rope activity, data scavenger hunt, and final projects, youth explored world-making with data as an active process, where they could express their agency within data interactions. Youth world-making emerged in their decisions as they investigated how technological sensors shaped their data, how their relationship with data impacted data's perceived agency, and how their design choices expressed their interpretation and priorities around data. Each activity showed youth how they were making decisions in the process of organizing data collection. Most activities used a micro:bit as a sensor to log variables such as time, acceleration, rotation, and light level. Most also created some type of counter variable for a score. The inclusion of data in their designs encouraged questions about how someone might use their design and promoted reflection on what it meant to use their device. The visualizations that youth created with their testing data ranged across multiple formats (e.g., bar plots, line plots, and violin plots). In their own projects, youth made decisions about which variables were most relevant to their design. They had the option to include all possible variables, but they intentionally decided to log specific variables relevant to their design, demonstrating how they were thinking about their technologies.

I highlight youth designs in this presentation. I find their sensemaking emerged from their version of the project code that included data collection. For example, one student, Tristan, created a hit tracker for playing dodgeball with a pressure sensor to evaluate, with a third party, whether a ball hit someone or not. He logged data from the external pressure sensor attached to his micro:bit. He used this within a coded conditional statement to decide whether something counted as a hit or not based on a boundary that he decided. He identified the range of values possible from the pressure sensor and noticed that the base amount of pressure was the number 1015. When

the sensor read this amount of pressure, Tristan categorized that reading as a "0" in the hit column, and if the reading was above 1015, then it became a "1" or a "hit." His conceptualization of a "hit" relied on the pressure sensor rather than on variables that could be logged with the micro:bit. I interpret this decision as emphasizing Tristan's understanding of what different variables afford, which shapes the opportunities and worlds that will be available from this data in the future. Another student, Alex, created a cardboard box hoop with an automated opening and closing mechanism. His design used a small engine for the moving pieces with a motion sensor to control when it was open or closed. To use his design, one person would be in control of the hoop and another person would be trying to shoot the ball as the hoop opened. Part of Alex's exploration involved thinking about game play, which he investigated by examining light-level within the hoop using the micro:bit. This variable could be collected to get a sense of when the hoop was open or closed over time. I interpret this decision as highlighting how the technology would be used and how data could help think about identifying strategies within the game.

These cases highlight how the youth were able to consider data collection as designers of a data recording device. Youth acknowledge the decision-making process within data collection. Positioned as researchers, the youth's choices express their priorities in their designs, while revealing how they may or may not consider data as useful for the process of design. I emphasize decisions in this process as they relate to the world-making process with data. It is through our choices and contexts that we arrive at different worlds, and through the reflection of these decisions we can start to build bridges between different worlds.

World-making with data in an interdisciplinary, project-based curriculum on the forced incarceration of Japanese Americans

Trang C. Tran, Ashieda McKoy, Raesheena Kennedy

This study is part of a broader co-design effort to integrate data and data practices in promoting interdisciplinary, project-based learning in middle school curricula. Over the two pilot years, Our World through Data (OWTD) engaged classroom teachers, data specialists, curriculum developers, and learning scientists to co-design a data-infused addendum for an existing EL Education (https://eleducation.org/) module about the forced incarceration of Japanese Americans during World War II. During this curriculum, students read *Farewell to Manzanar*, a memoir written by Jeanne Wakatsuki recounting her family's forced relocation to the Manzanar internment camp. Students worked with a curated dataset to write data stories and share their perspectives about the historical injustices that marked Japanese American experiences before, during, and after incarceration.

Drawing from the Critical Race Theory (CRT) tradition of constructing counterstories as worldbuilding, our study approaches *world-making* in the physical and social contexts of the classroom's learning environment cultivated by Ms. Kennedy (the third author), one of the three classroom teachers in the team, and her students. In this work, we point to a key tenet of CRT that explicitly privileges the lived experiences of Black, Indigenous, and People of Color communities as "voice scholarship" (Tate, 1994), centering them as rich counternarratives where people of color speak with experiential knowledge about inequity and contradiction, particularly in learning spaces. Counterstories fuel reinterpretation, reimagination, and challenge of harmful discourses and policies about BIPOC communities and our futures (Bell, 1992). These practices help us document injustice issues that our communities face, freedom dream (Kelley, 2022) and find our way out of racist constraints.

Kennedy taught 8th grade Humanities in a midwestern urban school. Combining English Language Arts and Social Studies in a block hour lesson, she intentionally facilitated a series of sensemaking activities to familiarize students with the context that the *Farewell to Manzanar* memoir was based on, and, at the same time, make space for students to recognize and express their emotions while reading and learning about this overlooked injustice. Teaching students to interpret and craft narrative from a dataset that our team curated as part of the curriculum, Kennedy emphasized the importance of her students "seeing the people that were incarcerated as human beings," gaining a personally meaningful experience with data storytelling (see Kemble & Wilkerson, 2024), and developing agency to become "upstanders" rather than "bystanders" when they themselves encounter injustice. Her process of teaching with data involved prompting students to reflect on "who are these people in the dataset," "how were their lives before Manzanar," and "what were the moral implications of their wrongful incarceration." Her justice-focused praxis was articulated in both formal teaching as well as unconventional activities. During OWTD, students engaged in gallery walks to take notes and hold conversation about the archival artifacts related to the incarceration, took turns reenacting scenes from the book, and participated in a culminating "World Café" event, when their familiar classroom was transformed into a space reminiscent of a coffee shop, a setting where "people meet and have a conversation on what they care about" as described by Kennedy during an interview. Throughout, students were encouraged to organically move around the room and engage in critical conversations that were inspired by both their recent learning experiences and their peers' ideas. These unconventional participant and activity structures were both indicative of and generative for Kennedy's vision

and enactment of world-building that foregrounded embodied learning and authentic interactions with data. Now, we turn to share an example of student engagement in world-making with data.

Staring at the Chromebook, Omari was having a hard time making the connection between the data and a moment in the book. As a dedicated gamer, Omari loved spending hours online diving into vast amounts of information and researching different issues. That was the reason why the OWTD's online data analysis tool initially piqued his interest, presenting itself as a new game for him to explore. However, he felt stuck when asked to build a narrative using the data in front of him and connect that narrative to a theme in the book. At this moment, his curious eyes caught Xavier's screen. Xavier then shared with Omari his approach to building a data story, how he looked at several attributes then narrowed it down to "which ones I could make a data story with." After hearing Xavier's passionate account, Omari created his own story and explored an issue none of his classmates ever considered. He remembered a detail from the book where Jeanne attempted various pursuits, like baton twirling, ballet, becoming a majorette, to "feel more American." Using the data provided, he made a graph which revealed that after leaving the camps, Japanese Americans were involved in different efforts, centering "community-building," "support Japanese culture," "work-related," as well as "recreational." When bringing the pieces together to compose his own data story, he wrote:

> "During World War II, Japanese Americans had to change … everything familiar to them to fit in with others. But some parts of them wished to remain the same. After incarceration, joining organizations [might have] helped them feel more like they belonged, [allowing them] to maintain [what] made them feel like themselves."

Through the lens of CRT, we identify the worldbuilding lens and enactment in Kennedy's classroom where she grounded data lessons to 1) center Black and Brown students whose lived experienced are seldomly prioritized in learning materials, 2) frequently and critically imagine alternative worlds and futures rooted in freedom, as well as 3) leverage new or "remixed" technologies and tools to build and enact these worlds. This was, in part, presented through Kennedy's efforts to center the task of "data storytelling" to 1) instigate and embolden compassion for the Japanese American community and 2) engender a personable and humanizing learning opportunity for her students. Concurrently, we underscore the move that Omari made: he chose to not conform to the popular narrative in the room which focused on the sustained brutality encountered by Japanese Americans before, during, and after incarceration. Our case study unveils how interactions with the dataset allowed him to name the importance of recognizing that their complex world that was marked by struggles and sufferings, but also, and more importantly, by healing, joy, and belonging.

Significance

The notion of world-making is not universally defined and has not been widely explored within K-12 and informal data science education (Concord Consortium, 2024). Our group's core explorations of storytelling with data, critical data literacies, and humanizing data practices provided us with a shared discursive space to deliberate how best to define this new lens, and how attending to perspectives on world-making with data might uniquely position us to strengthen our relational understandings of data. Further, we found a world-making lens helped challenge traditionally dominant data practices and perspectives that have allowed only select worlds to be seen and understood, prioritizing a perspective that values multiple types of data representations. In exploring our first research question, *how might using a world-making lens deepen and expand our data science research and understanding?* We find (1) our shared notions of expanded data open pathways for recognizing multidimensional, multifaceted world(s) and (2) adopting a world-making lens can aid in making explicit and clarifying obscured relations, building bridges across worlds, and surfacing assumptions about these worlds.

Killen demonstrates how a world-making with data lens can be used to *clarify* the data norms a community builds. In her case, a data world that studiously avoids the term climate change. She also finds indications of how this world-making choice might contribute barriers to the type of *bridge building* she aimed to accomplish in her work between the locally known and the scientifically known. Quiterio, similarly, uses world-building to *explicate* the multiple worlds and views around when and what data is considered valuable for teens to collect. One possible world prioritizes "Big Data" as a source of truth (boyd & Crawford, 2012) and often values collecting as much data as possible. Another world understands how small and personal data can be useful, and supports intentional, contextualized, and critical data generation and collection practices (Pangrazio & Selwyn, 2021). A world-building lens supports her, as a researcher, to better navigate between these worlds and views of data. This leads to a better understanding of how youth might also *bridge between worlds* through intentional data practices.

Bridge building is also central to Nguyen's demonstration of how an adult uses data as a mediator to travel between the local and the global, shown through how a family was able to travel amidst the ruins of

modernity. Apollo, a new electric vehicle (EV) owner, understood the common global, modern narratives about the futures of the EV market. He also understood local concerns of family life having to do with transport. He worked to bridge the two in his experiment, taking the EV on a family road trip. Arnold explores the *clarifying* aspect that a world making lens affords in understanding how a district math leadership team's use of data allowed teachers and administrators to share the challenges and successes they experienced in their classrooms and schools. He found that the collective narration of data provided a space in which the practice of math teaching, which is often private, was made public by members. Arnold found that sharing such experiences afforded members an opportunity to *surface assumptions* across worlds and to bridge experiences in the pursuit of improving math education.

Tran and colleagues explain how a classroom educator mediated data interactions by creating and enacting engagement norms and through being intentional in helping her students make *explicit* relations to a topic largely unfamiliar to them at the beginning of the module. A world-making with data lens supported Tran and her colleagues to understand how Omari's process of crafting a data story was an effort to *build bridges* across worlds. They also highlighted the moves that Omari made as representative of a counterstory, an effort to reconsider and reimagine an alternative world. Rather than suggesting that such an alternative world did not exist, the researchers interpreted his counterstory as a vehicle to make *explicate* a multifaceted world—one not only shaped by the profound injustice and suffering that Japanese Americans endured, but also by their strength to persevere, to build community, and to foster joy and healing.

Recognizing world-making might be both individual (Tachine & Nicolazzo, 2022) and collective (Wolf, 2020), we now understand world-making as a vehicle for holding ourselves, as data science education researchers, accountable to perceiving multiple worlds. During the dynamic engagement section of the symposium, we aim to organize a rich discussion with attendees to address our second research question: *what greater contribution to data science education might taking the stance of world-making with data allow?* This time will be used to unpack how a world-making lens might variously facilitate explicating, clarifying, bridging, and surfacing assumptions in not just individual work but in the discipline of data science education more broadly. We wish to explore how the field might *relax current constraints placed on data science education* and how that might include responsible and ethical world-making with data.

Making visible the data practices and perspectives we use empowers us to engage in complex and nuanced conversations related to our global and local worlds. Traditional approaches to data science can emphasize a one-world view that is most closely associated with the world in which data were generated. Used uncritically, data can serve as a dangerously powerful tool to support current and future injustices. Across our work, we emphasize an approach to data that advocates for a diversity of perspectives and fosters a pluralistic, agentic future We see world-making as a lens to relax the one-world constraint by acknowledging that there are multiple, different worlds that data might speak to, thus pointing to pathways for data science education, and for data science education researchers, to explicate, clarify, bridge, and surface assumptions about those different worlds, and support a multiple relational understanding of the world through data.

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