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From Accommodation to Inclusive Play: A Culturally Sustaining Design Approach to Play and Learning

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Abstract: This project moves beyond accommodation for individuals with disabilities toward true inclusion in learning spaces. In collaboration with a community organization and public school district, we employed participatory design to transform playgrounds into inclusive computational thinking environments for kindergarteners. We shifted from accommodation-focused design to centering the experiences of learners with disabilities. These vignettes highlight how culturally sustaining design can empower marginalized communities, extend design paradigms, and create equitable educational environments that serve all children through inclusive play.

Introduction

Traditional design approaches have been criticized for primarily reflecting perspectives of the socially and economically privileged, resulting in technologies and learning experiences that overlook marginalized communities (Costanza-Chock, 2020). We co-designed a Smart Playground with Latine families, augmenting traditional structures with spatially-distributed robotics systems to engage children in computational thinking that builds from their cultural practices. Families and learners with disabilities emerged as influential co-design partners, expressing a strong desire for more inclusive play environments, providing an opportunity to collaboratively explore accessibility and inclusion, observing a critical shift in understanding—from viewing accessibility as accommodating learners with disabilities to centering their practices as the norm for all children. We examine two key questions: **(1)** What were the perspectives and aims of our co-design partners as they advocated for inclusion of children with special needs? and **(2)** How did the design prototypes help shift design metaphors and goals of inclusion? This paper documents a transition from accessibility as accommodation to broader conceptualizations of inclusive design.

Conceptual framework

Our research integrates three design perspectives that inform our approach to inclusive design. Universal Design (UD) (Mace, 1991; Norman, 2013) provides a foundation, though we reposition its traditional framework by shifting the referential point from an implicit able-centric norm to design centered on play practices of children with disabilities. While traditional UD approaches often implicitly standardize experiences through an able-bodied lens (Gibson, 2014), we maintain UD's core principle of a unified play experience. Design Justice (DJ) (Costanza-Chock, 2020; Collins, 2020) further guides our methodology by recognizing children with disabilities and their families as experts, thereby avoiding the creation of solutions that might inadvertently cause harm. By decentering traditional design authority, we ensure that our approach actively involves families and special education teachers as co-designers. Culturally Sustaining Design (CSD) (Anderson-Coto et al., 2024) defines culture as shared practices within the disabled community. Through CSD we elevate disability experiences as a foundation for inclusive design, rather than mere accommodation to a normative standard. By centering community knowledge throughout our design process, we challenge traditional design paradigms and create more authentic, meaningful interactions.

Methods

We used participatory design (PD) grounded in Cooperative Inquiry (Druin, 1999) and CSD (Anderson-Coto, 2024), positioning Latine families (13 caregivers, 28 children) and six ethnically diverse teachers (White, Latina, Asian) as design partners. Family sessions focused on learning/play concepts, technology interfaces, and physical prototyping, while teacher sessions targeted playground dynamics and prototypes for social interaction. Transcripts were coded exploratorily, revealing accessibility as a central theme. We examined how participants' practices for learners with disabilities were adapted in their designs and how these designs promoted inclusion beyond accommodation.

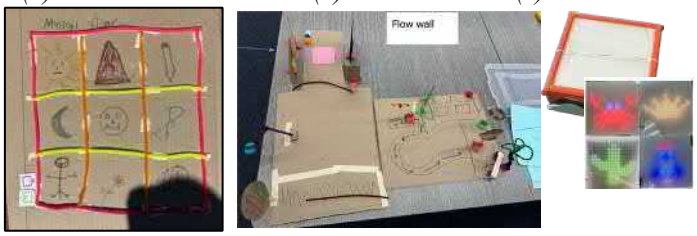
Findings

The Smart Dance Mat prototype (figure 1) emerged directly from a mother's intimate understanding of her child's communication strategies. Inspired by the communication tablet used at home and in school, she translated a familiar assistive technology into a playground-wide interactive system. The communication tablet—a daily tool that allows her nonverbal child to express needs and emotions through symbols and sounds—became the conceptual blueprint for a playground design. As she explained, the tablet functions "[l]ike a board... with buttons. All this... in tablet form," where her child "goes and searches" to communicate. By reimagining this familiar device at a playground scale, she proposed a grid-like mat where each square produces a distinct musical sound when stepped on, effectively expanding the communication strategies her child already uses. The design also drew from her observations of how music serves as a regulatory and engagement tool in her child's daily life. "With the music they relax," she noted, highlighting how this familiar practice could be transformed into a playground-wide sensory experience. Her approach integrated her child's communication and sensory regulation practices into a shared environment, seeking to transform the playground to a space of mutual understanding.

The Flow Wall (figure 1) was developed by special education teachers who directly translated their classroom learning strategies into playground design. Their prototype emerged from specific hands-on activities they regularly use to teach collaboration, pattern recognition, and problem-solving. One teacher described a classroom activity that inspired the Flow Wall: "They have circles, put them all in the right spots, patterns counting to do it with only five circles… These are physical things they have to pick up so they have to work together". The teachers recognized that their classroom practices of using visual and tactile learning could be expanded into a playground context, transforming their existing pedagogical strategies into a playground design that encourages collaborative play. Their approach was grounded in an understanding of how children communicate beyond verbal language—a principle they observe daily in their classrooms. As one teacher noted, children can communicate "[in] their own little way," a perspective directly informed by their experiences watching students interact on the playground.

Figure 1

(a) The Smart Dance Mat (b) The Flow Wall (c) The Mat Prototype



(a) (b) (c)

Conclusion

Through PD, families and teachers created inclusive spaces by centering the practices of learners with disabilities. These designs demonstrate a shift from mere accommodation to inclusion. In response, we developed prototypes like the Smart Floor Mat—squares distributed throughout the playground with LED lights that change when stepped on, enabling children to create visual communication patterns. This prototype addressed a mother's vision of children playing together through a common communication medium. We reconceptualize inclusivity beyond accommodation by centering the practices of children with disabilities as the normative foundation of design. This shift eliminates the need for differentiation, as environments inherently incorporate diverse communication modalities. We advocate for participatory methodologies that transform frameworks for inclusive learning spaces, creating environments where disability-centered practices benefit all learners through enriched interactions.

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