

Justice-Centered Ambitious Science Teaching in Community Spaces: Foregrounding Creativity, Connectedness and Joy

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Abstract. This poster explores the unique and powerful affordances of justice-centered ambitious science teaching (JuST) in two intergenerational community spaces as reflections of an interdisciplinary theory of learning. The results of a cross-case analysis exploring ways JuST practices impacted learning in two related but distinct educational settings spaces revealed boundaries between teaching and learning as blurred, agentic creativity that led to connectedness and joy, and leadership by people of Color as shaping perspectives and priorities.

Major issues and significance

We lack lived examples and nuanced understandings of educational settings that align with current, interdisciplinary theories of learning, accounting for the cultural, social and emotional aspects of learning, while maintaining criticality related to fundamental assumptions of what science is, who does it, and for what purposes (Nasir, et al., 2021). This cross-case analysis comparing learning affordances of a teen showcase with those from a neighborhood forum revealed ways that intentionally and creatively structuring science education in community spaces to be justice-centered and ambitious has the power to lead to deep and equitable learning. Compared to formal learning settings, community spaces can more easily draw together and connect people from different generations, people who have different areas of expertise, and people who span cultural backgrounds, thereby potentially challenging typical roles of leader and follower, teacher and learner. Learning in community spaces is not held hostage by the same political and accessibility pressures felt by schools, inviting agentic creativity. It also invites unique ways of relating, connecting and sharing emotions around shared interests. Agentic creativity, connectedness and joy are transformational elements of a justice-centered ambitious science teaching lens (explained below) that offers a framework for considering how particular aspects of science learning in community spaces can lead to deep and equitable learning in potentially unexpected ways. The two cases share a common focus on science learning used to promote COVID safety, especially for communities of Color. Both cases involve leadership composed primarily of people of Color. This study aligns strongly with the conference aims: to promote equity, investigate innovative learning environments, and elucidate theories of learning.

Analytical and methodological approaches

Learning is rooted in the intersecting facets of human development (biological, social, cognitive, emotional); thus, it is necessary to support the whole-person development by creating learning environments that address these needs (Nasir et al., 2021). Learning takes place in cultural practices across people's lives as experienced and embodied through social interactions, beyond the ways reflected in most current classrooms. Implications of this more expansive and interdisciplinary theory of learning involve fostering deep learning, engaging learners as their full selves and disrupting patterns of oppression and inequity (p. 557). Creativity, connectedness, and joy are transformational foci as they touch on the social, cultural and emotional realms of human development and push the boundary in what counts as science and what science is for.

Ambitious Science Teaching (AST; Windschitl, et al., 2018) outlines sets of teaching practices that center collaborative sensemaking. Though AST intends to offer all learners access to meaningful science learning, these practices fall short of challenging the inequitable and unjust contexts, constraints and consequences that shape learning for marginalized learners. As a response, we articulate a goal of Justice-Centered Ambitious Science Teaching (JuST) that explicitly identifies equity imperatives beyond simply access. Leaning on Phillip and Azevedo's (2017) work, JuST practices challenge the core foundations of what it means to do science, by whom and for what purposes. JuST practices thus align with Nasir et al.'s (2021) learning theory, highlighting the range of community and cultural experiences across life courses and across multiple settings that count as science learning while also underscoring the need to attend to, name and disrupt the systemic injustice at work. From these frameworks, creativity (agency), connectedness (relationship), and joy (emotion) become points of emphasis in designing for transformational environments.

In this study, we employed a cross-case analysis (Stake, 2006) to explore the ways JuST practices nurtured participants' engagment in two diverse events related to the same overarching project, which shared a common focus on becoming COVID literate in order to keep our circles safe, especially for communities of Color. Particularly, we asked



questions about how creativity, connectedness, and joy were realized in community spaces designed for transformational science learning and what design elements led to these outcomes. The first case explores a public showcase where middle school teens who participated in a seven-week afterschool science club shared the practices, findings, and implications of their inquiries with family, school personnel, and others through hands-on demonstrations and video-based public service announcements. The second case explores a neighborhood forum organized by an intergenerational team of urban community members to offer fellow residents opportunities to engage with three physicians employed at a local hospital. This forum was facilitated by Author #3, a young Black man who leads and facilitates ongoing community work with the organizers. Both initiatives focused on critical equity teaching and learning in and through science. Primary data included photographs, transcribed recordings, and written field notes from both events. Codes were generated from the analytic framework and included agentic creativity, connectedness, emotion, ways of knowing, and criticality.

Major findings, discussion and implications

Creativity, connectedness, and joy were realized in both community spaces through expansive aims and experiences prioritized by people of Color who led the learning in each setting. Throughout the teen showcase, in student-led interactive stations as well as student-created films, youth, the majority of whom are students of Color, positioned themselves centrally as scientists, science educators, and other experts. Authoring the questions that were pursued (COVID myth posters), defining scientific methods employed (mask experiment data), creating scientific explanations (solo cup tower-building to stimulate protein synthesis), and drawing implications (COVID prevention messages in public service announcements), youth shaped and owned science, meaningfully expanding the forms and formats traditionally considered to be "science." Participants were engaged physically and in many different forms. As stars of the scientific show who taught adults including family members, school personnel and unknown others, youth engaged groups of attendees with rigorous science *on their own terms* - wearing Einstein wigs, throwing COVID stuffies to interrupt protein building, and pretending to be doctors to diagnose attendees' dramatized imaginary symptoms. Laughter was core to the science doing, thinking and talking; youth designed laughter into their science and did not edit it out for public professional presentations. Youth situated their messages in student-scripted dramas that contextualized *their* understandings of science, COVID and community (e.g. situating a storyline in the context of *Twilight*, a familiar teen novel turned movie).

In the Neighborhood Forum, Author #3 and the community organizers, all people of Color, selected and directed the activities, ways of interacting and foci of the discussions. Though physicians had prepared to explain the science of COVID, community members were the drivers of the conversation. Not only did community members choose the focus of the science that was to be shared by authoring the questions, they situated these questions in their own lived experiences. Scientific ways of knowing, which for many people of Color are situated in mistrust of the medical field, took back seat to historicized and lived ways of knowing. Laura, a mother of teenagers who have not yet been vaccinated, cried as she shared her rationale, "My children are my whole life! I am their own sense of protection." After she explained her tensions in navigating messages about vaccination, physician Amy validated the sense of pressure associated with parenting, responding with a surprising answer, "Don't trust us because we're experts; instead prioritize the voice of an expert who has, over time, earned your trust." Community leaders, along with other neighbors in attendance, served as judges of the usefulness of the event, highlighting what mattered most to them, namely humility and accessibility. Feeling heard and understood mattered more and was valued over being convinced by studies and citations. Evidence of relationships being built was seen throughout in honesty, transparency, tears, laughter and explicit words of appreciation.

Science, in its traditional form, prioritizes some people while invisibilizing others. In order to meaningfully address equity, what counts as science, what science is for, and who benefits from science had to be critiqued and expanded. Centering voices from marginalized groups, nurturing creativity and agency while legitimizing the outcomes, and honoring the necessarily emergent nature of the learning interactions and outcomes contributed to the transformational power of science learning in these community spaces. Attending to the cultural, social, and emotional aspects of learning afforded by community spaces, JuST practices that centered sensemaking in expansive ways for expansive purposes led to a) creativity in forms of what counted as legitimate scientific data, analyses, expressions and interactions; b) connectedness across generations and social groups through roles, personal recognitions and physical positioning in circles; and c) joy and other emotions steeped through most interactions that were both light-hearted and deeply felt. When we view learning through a critical lens, we reimagine the potential and importance of creativity, connectedness, and joy.

References

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