ORIGINAL PAPER

Communities of practice and the elevation of urban elementary teacher discourse about critical pedagogy of place

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Abstract

Children who live in under-resourced communities and attend under-resourced schools deserve access to high-quality teachers and educational opportunities to support their success and well-being. This study emerged from a professional development (PD) for urban teachers working in such schools, to expand educational opportunities for elementary students through outdoor science teaching. Engaging frameworks of communities of practice (CoP) and critical pedagogy of place (CPP), this critical ethnographic study investigates how urban elementary teachers engage in discourse about critical issues of place. Additionally, the investigation seeks to understand how a CoP supports such discourse. The primary data for this study were multiple sets of researcher field notes collected from participant teachers during virtual spring and in-person summer PD. Over the course of the PD, participants shifted from viewing their outdoor teaching spaces with a deficit perspective to an asset-focused one. As they visited one another's teaching sites, the CoP the teachers were a part of created opportunity for discourse about social justice linked to issues of place within their particular school neighborhoods. The ability of urban elementary teachers to connect social justice to issues of place and to the teaching of science has implications for countering the injustice that characterizes many urban communities in the USA and elsewhere.

Many of America's urban schools are a product of social engineering and unjust policy-making that have rendered them disadvantaged and under-resourced (Watkins 2001) and created an educational debt (Ladson-Billings 2006) owed to students in these contexts. The

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challenges of teaching science in under-resourced elementary schools are immense but not insurmountable. Children who live in such communities, whose lives and health are at greater risk in part because of poorer infrastructure, fewer resources, and social inequities, deserve to have access to high-quality teachers and educational opportunities (Rodriguez and Morrison 2019). The ability to do and to understand science contributes to young people's personal well-being and academic success, in both the immediate and longer term. These benefits might also extend to family members and to the larger community. It is also critical that the science itself, as expressed by the problems being addressed, is relevant to their lives and interests (e.g., Jenkins 2011; Upadhyay 2006). To function as a catalyst for social change, equitable science education needs to engage with issues that directly affect the communities where students' schools are located (Morales-Doyle 2017).

The communities referred to above have often erroneously been viewed through a deficit lens, but the reality is that there are numerous resources, both human and material, within these communities. However, these resources are not always leveraged in support of teaching and learning, in part because of barriers to access and implementation (e.g., Allen and Heredia 2021) and because of a lack of understanding about their potential power (e.g., Haberman 2010). We know from research that time in the outdoors (e.g., Wallner, Kundi, Arnberger, Eder, Allex, Weitensfelder and Hutter 2018) and centering instruction on problems of relevance to learners (Hofstein and Kesner 2006; Shasha-Sharf and Tal 2023) can have powerful positive impacts on students' well-being and achievement. Thus, understanding how best to support meaningful outdoor teaching and learning is an important focus for researchers.

There is another reason why teaching and learning in local outdoor spaces is important and powerful. This arises from the fact that, as noted earlier, there is an inherent connection between science and issues of social justice, particularly in under-resourced communities and particularly for individuals of Color, especially when these individuals make up the majority of the population in the urban spaces that are the focus of this study. Researchers have demonstrated, for example, that an instructional focus on chronic health conditions, such as asthma, diabetes, lead poisoning, asbestosis and other forms of cancer, can lead to higher levels of engagement and achievement among students, especially in communities significantly affected by these conditions (e.g., Modell, Bayer, Kardia, Morales, Adler and Greene-Moton 2023), which often (are the result of negative environmental factors, such as lack of access to clean water and air, fresh and healthy foods, and adequate health care (Butler and McMichael 2013)). They also are compounded by minoritized groups' lack of representation in processes that would identify and address the environmental causes and resolution of these health issues. Even if the broader educational community was in agreement that real-life problems should be the focus of science instruction, the enactment of this commitment requires teachers who are prepared for this approach to science instruction.

A teacher's ability to implement strategies which center meaningful real-life experiences or phenomena has an impact on the children they teach, both cognitively and socioemotionally. The impact has been well documented in the research literature (e.g., Corso, Bundick, Quaglia and Haywood 2013; Marx et al. 2004), and while this ability is in part the product of complex knowledge about content, context, and learners, it is also the result of a capacity that is shaped by the educator's own sense of connection to place and a sense of well-being, and that interaction shapes a teacher's effectiveness and resilience as a classroom educator (e.g., Schonert-Reichl 2017). Educators and professionals in other disciplines have experiences which are the foundation for a set of memories and connections that are built over time, and these contribute to a sense that particular places are important

and to an emotional connection to and well-being in these places (e.g., DeMiglio and Williams 2016). Over the past three years, both local and worldwide events, such as the increase in school shootings and the COVID-19 pandemic, have challenged this well-being and resilience in a way never observed previously. The need to be responsive to teachers' own well-being while at the same time supporting them in developing new and responsive pedagogy is key to moving science teaching toward innovation that respects educators, their students, and the communities in which they live and work (Adah Miller et al. 2023). Thus, framing professional learning opportunities as a social justice imperative for educators as much as for their students is an issue which should receive much more attention in educational research. Toward that end, we recognized the importance of creating a space for addressing such needs with particular attention to the ethic of care (Noddings 1988) and for elevating the criticality of place. As a result, we directed our efforts at developing communities of practice among formal, informal and university educators and educational researchers to raise up issues of place and belonging in teaching and learning science in outdoor urban spaces. We explored such issues with the twin goals of serving the needs of educators and of the children they serve, both socio-emotionally and cognitively. Our work consisted of both virtual and face-to-face interactions across a spring–summer-school year cycle with elementary teachers and informal science educators in two major urban communities. These communities often have insufficient representation in policy decisions which affect their physical, economic, academic and psychosocial well-being (Bullard and Johnson 2000; Malcom and Malcom 2011; Salisbury, Sheth, Spikes and Graeber 2023).

The work reported here was guided by the following research question: How does discourse about social justice and critical issues of place arise in professional development focused on science teaching and learning in urban outdoor spaces?

Theoretical frameworks

We approached our question through the lenses of critical pedagogy of place (CPP) and communities of practice (CoP). More specifically, our project design was based upon our stance that CoPs can provide the space, context, and tools for the development of CPP among its members. We unpack these two frameworks below and provide a brief overview of their salience to the questions driving our investigation.

Critical Pedagogy of Place. This theoretical framing depends heavily upon what "place" actually is. For our purposes, we use Tuan's (1979) conception. Beyond just a measurable space in the world, place "…has a history and meaning. Place incarnates the experiences and aspirations of a people… it is also a reality to be clarified and understood from the perspective of the people who have given it meaning." (Tuan 1979, p. 387). Researchers (e.g., Stevenson 2008; Aikenhead, Calabrese Barton, and Chinn 2006) have made the claim that science and learning are about place, even when place is a conflicted site. Yemini et al. (2023) argue that place-based education grew in popularity in an effort to reject neoliberal ideologies and educational reforms that ignored cultural connections, community and environmental protection. Although Gruenewald (2003) and others prioritize school-community relationships (Yemini et al. 2023), modern schooling in the USA is typically divorced from place, in part because of the decline in neighborhood schools due to increased bussing of students to schools outside the local community and recent emphases on standards and testing, which have resulted in a shift toward alignment with neoliberal objectives. These trends, Noddings (2002) notes, promote a kind of generic education for "anywhere",

and... such an education might easily deteriorate to an education for "nowhere." (p. 405). Place is the intersection of the human and the natural, the built and wild, the social and cultural. The same space can be experienced as different places by different social groups and individuals. It is also the case that members of disenfranchised groups are either ignored or not welcomed in some places (e.g., Dawson 2014; Feagin 1991; Finney 2014), so it is not surprising that marginalized students would be reluctant to engage with learning opportunities in such places, even when invited. Critical pedagogy of place or CPP is a perspective which was developed to begin addressing these interacting issues of place and power.

Gruenewald (2003) proposed an approach that brings together critical pedagogy and place-based education in an effort to resolve issues with each. Proponents of CPP argue that it offers instructional solutions that critical pedagogy lacks and a depth and place for social progress that is absent in place-based education. CPP has two main objectives: reinhabitation (learning to live well in a place that has been disrupted or injured) and decolonization (learning to recognize and confront dominant ideologies that are disruptive and injurious) and suggests interrogating what has happened in the past and why, and what can happen in the future that both acknowledges and disrupts past patterns. These two objectives are to be met through an intentional combination of critical pedagogy and place-based pedagogy, which he has termed a "critical pedagogy of place" (Gruenwald 2003, p. 3; see also McInnerny et al. 2011). By showing how place-based education and critical pedagogy complement and enhance each other, he presented an adhesion of the two discourses as an appropriate framework for constructing and analyzing curricula in various sociocultural contexts. The CPP framework has been adopted by other authors, primarily in theoretical ways, though some empirical work has been done through autoethnography (Cutts 2012), and with high school students (Barnum and Illari 2016; Huffling et al. 2017) and teachers (Manning 2011; Perumal 2015). For example, Perumal's (2015) work with teachers in South Africa detailed instances of social justice that they observed in students and their families and which they experienced personally and interpreted them using a CPP lens. And, as CPP advocates, these local incidences are connected to injustice at national and global scales.

In the US context, many urban locales have a largely Black, Asian or Latine population, who as a group are often marginalized, victimized and dehumanized despite their large numbers. CPP, therefore, has implications for urban and multicultural education by acting as a framework for educational theorists, researchers, policymakers and practitioners to reflect and act upon student situations in humanizing and holistic ways. As McInerney, Smyth, and Down (2011) describe:

> A critical perspective in PBE [place-based education] encourages young people to connect local issues to global environmental, financial and social concerns, such as climate change, water scarcity, poverty and trade. It invites teachers and students to question the established order, to view how things are from the position of the most disadvantaged, and to work for the common good rather than self-interest. (p. 11)

Gruenwald (2008) describes several questions that are key to CPP—"What is happening here? What happened here? What should happen here? What needs to be transformed, conserved, restored, or created in this place?" (p. 149). These questions were very present in our conversations with teachers both in urban parks and in their schoolyards. Project participants and the research team worked together to identify ways to thrive in communities that have experienced disruption and have been harmed, and to recognize the mechanisms that brought about the disruption and harm. It was especially important that these objectives be met in collaboration with the educators who are residents and/or stakeholders

in these communities that have been disrupted in one way or another. To achieve this collaboration, the team was intentional about fostering a community of practice (CoP) through which this aim could be achieved. We turn our attention to unpacking the ways in which such a community could facilitate such understandings and support resulting action.

Communities of Practice. The notion of CoP, the second theoretical framework which we made use of in this study, was first articulated by Wenger (1998). Its original application was in contexts involving situated learning for apprenticeship-based professions (e.g., tailors) where a spectrum of practitioners from novices to experts are part of the same learning community, and all participants can contribute to the work and benefit from it. They do so by developing the capacity to—in the case of the teaching profession—improve their instructional practices. Key to a person becoming a part of such a group is their commitment to and participation in activities and practices of the situated community (Linehan and McCarthy 2001). We applied the principles of CoPs in this study by bringing together educational professionals into a learning community. The collective knowledge and experiences that teacher participants shared of their urban locale was foundational to the fostering of a CoP that allowed them to mutually engage with one another toward a joint enterprise and via a shared repertoire. Below we expand on these three CoP elements—mutual engagement, joint enterprise, and shared repertoire—as they relate to our specific project context.

Mutual engagement occurs through multiple types of interactions and activities that signal an individual's participation in the CoP and center collaborative interactions. In this project, the participants had opportunities to dialog and engage in joint projects around common questions, logistical problem-solving, and facilitated norm-setting and community-building. Professional development activities were semi-structured and took place in settings in which each group of professionals had expertise (classrooms, schoolyards and other nearby outdoor spaces). As the two groups continued to work together, the engagement took on a more informal approach as they interacted and swapped stories of place and shared strategies for success in their teaching roles as elementary educators.

Joint enterprise consisted of teaching science to urban elementary students in a meaningful and engaging way in the physical classroom and in the outdoors. We took the stance that the outdoors is an extension of the classroom and offers rich phenomena to observe and investigate, and this stance was reflected in all of our work with participants. A key characteristic of joint enterprise is diversity and complementarity of knowledge and experience. The educators involved in this CoP (elementary teachers and informal science educators) had varying amounts of science teaching experience and a range of comfort levels teaching science in outdoor spaces. "Working together in communities, both new and more experienced teachers pose problems, identify discrepancies between theories and practices, challenge common routines, draw on the work of others for generative frameworks, and attempt to make visible much of that which is taken for granted about teaching and learning" (Cochran-Smith and Lytle 1999, p. 293). This led to a shared repertoire which facilitated the building of a culture within this newly formed community.

Shared repertoire within a community of practice refers to a system of shared language, ideas, and various representations that help to shape the cultural and organizational identity within CoP. In the context of this project, there was common jargon (e.g., novelty space), common techniques of instruction and investigation (e.g., ten-minute observations or data collection), and common shared histories of experience. Having a shared repertoire enhanced effective communication and understanding among the CoP members, which continued to support their sense of belonging and participation within the group.

Urban students do not engage with outdoor nature as frequently as their non-urban counterparts (Lin 2017) for a variety of reasons. Within an established CoP, teachers and ISErs are able to discuss why these inequalities exist as well as what can be done to break down the barriers—both local and systemic—that result in urban students having less access to outdoor science learning opportunities than counterparts in non-urban communities. Thus, the CoP emerged as a space for attention to and action taken toward social justice issues affecting the students.

Methodology

Positionality

The authors of the paper and facilitators of the workshop are primarily White and all are women. The first author is a White woman and a very experienced researcher in urban science education residing and working in the Midwest state where the program took place. The second author is also White and is a researcher with a great deal of experience teaching outdoors and supporting teachers in doing so. The third author is a Black former science teacher from West Africa, currently living in the US, whose research focuses on decoloniality, equity and social justice in science education. The fourth author is a White experienced informal science education researcher from a non-US country who was part of the PD design and enactment. While we as a group have focused on issues of race and social justice, we do not share the same life experiences as our participants, our Black teachers in particular, and so sought to use multiple data sources to support our findings; we also member-checked those findings with participants and used their feedback to adjust or clarify our reporting of the data.

Project Context. The project was focused on the support of educators in two large urban school districts in the state. In this paper, we present findings from our work with teacher participants from the larger of these two, which is also the largest school district in the state, with almost 50,000 K-12 students attending 107 schools. Black students make up the overwhelming majority of the student body (98%), which well exceeds the state average (35%), and approximately 27% of families in the city live in poverty, well above the state average of 13% (Statista 2023) (https://www.statista.com/statistics/205477/poverty-rate-in-michigan/#:~:text=Michigan%20%2D%20Poverty%20rate%202000%2D2021&text=In%202021%2C%2013.1%20percent%20of,lived%20below%20the%20poverty%20line).

The goal of the project is to support urban elementary teachers in teaching science in their schoolyards and communities in a place-based way. The PD program uses a CoP model in which there is intentional community-building as well as organic development of community at each stage. Informal science educators with experience teaching outdoors are also participants. Their inclusion was purposeful and designed to take advantage of their specific professional expertise and experiences and to allow them to learn more about working with urban students from the teacher participants and to "narrow the gap" between formal and informal supports for teaching and learning through the development of partnerships. The PD is designed to present both groups as peers who each are more knowledgeable in one area while interested in learning in the other, including personal asset mapping for the community. The goal of the PD is for teachers to experience outdoor science activities as learners and to engage in critical analysis of their potential power for teaching and learning in their particular school contexts. The PD took place in two phases: an

Table 1 Professional development components and timeline

	Structure	Project/group goals	Examples of goal enactment
Spring PD	4 virtual sessions, 90 min each	To begin building a community of practice To build familiarity with summer tasks (reducing novelty)	Group asset mapping Frequent small group work Schoolyard mapping Discussion of perceived barriers to teaching outside
Summer PD	3 days in a city park 2 days in schoolyards	To continue development and support of CoP Implementation and critical analysis of outdoor science investigations Continued critical analysis with consideration of specific school environment affordances	Shared narratives of life experiences in Rose Island Park Designed and conducted short investigations of microhabitats in the Hog Island Park ecosystem Schoolyard/neighborhood-based visits hosted by participants with CoP focus on affordances for teaching and learning

online four-session phase and an in-person week-long phase that took place in a frequently accessed big city park and in the participant teachers' school yards and neighborhoods (Table 1). In both the big city park and in our walking in the schools' neighborhoods, we raised questions and initiated discussions dealing with the history of "the place." While on Hog Island, we addressed the complex relationships between the initial White settlers and the Native Americans of the region and how they escalated (for example, the taking of Native land and removal of Native people from this land, the commission of violent acts) over the years. We then asked teachers to share their own memories of the park and its special role in their place-attachment. Similarly, in our school visits and neighborhood walks we asked each hosting teacher to share the history of her school and community. In those discussions, issues such as demographic changes the city went through and their impact on the schools and education were frequently addressed. In addition to the summer PD, ongoing support is provided during the school year, but these data are not the focus of the findings reported here.

Critical ethnography

In this study, we used a critical ethnography approach to guide all aspects of our work. Critical research is designed to study social action taking place in a social site and explain this action through examining locales and social systems intertwined with the site of interest. It is also designed to assess the subjective experiences common to actors on the site and determine the significance of the activities discovered with respect to the social system at large. Issues of power and inequality are central to critical research (Carspecken 2013). Calabrese Barton (2001; see also Calabrese Barton and Tan 2018) argues for the use of the critical ethnography methodology in studying urban schools. This particular approach is appropriate due to its explicit focus on "…participatory critique, transformation, empowerment, and social justice" (Calabrese Barton and Tan 2018, p. 771), and because it allows for the opportunity to challenge assumptions and their underlying supporting ideologies. In this work, in which we encouraged teachers to challenge physical and pedagogical boundaries, by getting out of classrooms and also for critical parts of the PD, away from their school buildings as well, we were interested in long-term interpretations of the involved teachers and in their deep and complex understanding of the school system and their navigation within this system, while experiencing and discussing outdoor teaching and learning. When outdoors and discussing opportunities and challenges of teaching science in these places, the teachers shared how individual and community histories were contextualized with respect to poverty, limited resources, high teacher turnover and a culture of evaluation and accountability.

Our ongoing interaction with the teachers through PD sessions during winter, spring and summer, visits to schools and ongoing communications enabled us to follow the teachers as learners, teachers and partners and created trust that supported the ethnographic work.

Participants and district demographics

While the overall project included both formal and informal educators, the present study focuses only on the former group of participants, which consisted of upper elementary teachers from the largest urban school district in our Midwestern state. Six teachers from

Table 2 Participating teachers

Name (pseudonym)	Ethnicity	Grade taught at start of PD	Years taught
Elli	White	5	12
Sarah	Black	3	11
Zaria	Black	3	6
Kelly	White	4	20+
Diana	Black	4	2
Tiana	Black	4	20+

four K-8 schools in this district served as participants in this study. These individuals were selected because they participated in all aspects of the PD program and data collection efforts. More demographic information about this group is reported in Table 2.

Data sources

We used three main data sources to inform our understanding of the program and participants. The primary source was field notes from spring and summer sessions. These were recorded during each session by multiple members of the research team, with at least two and often three sets of notes for any block of time or activity. This allowed for triangulation, with multiple accounts verifying what occurred; it also afforded us a more nuanced view of events and interactions. Our field notes captured events and interactions in two different ways—one was a more direct reporting of what participants were doing/saying; another represented impressions that we had of our interaction with participants and events that unfolded after-the-fact. The latter were narratives from the teller's/recorder's perspective. Field notes also captured one-on-one conversations between project staff and participants, something we referred to as "walk-and-talks" because of where these interactions occurred—while walking in the outdoors (as when transitioning from one site or activity to another) or while engaged in an outdoor activity together. Additionally, we analyzed interviews conducted with participants before and after the summer program. During these interviews, teachers were asked to reflect on their work as educators and their relationships with outdoor instructional spaces. In the pre-interviews, participants were asked about their goals, expectations, and hopes for the summer PD and what science teaching challenges they may have had. In the post-interviews, they were asked if their previously expressed expectations and needs were met, and how they planned to implement the learning from the summer PD in their respective classrooms. In both the pre- and post-interviews, participants were asked about their relationships to their schoolyards to investigate how they thought about place before and after the summer PD. We also analyzed daily reflections that teachers completed in writing at the end of each day during the summer session as well as relevant emails between program participants and staff.

Data analysis

We followed the five stages of critical ethnography suggested by Carspecken (2013) with some modifications because stages 1 and 3 were simultaneous: (1) building primary record through intensive note taking and videotaping which make the data "monological" in

nature; (2) preliminary reconstructive analysis identifying cultural themes and system factors which are "not observable"; (3) dialogical data generation bringing the voices of our partner teachers through interviews and other forms of conversation. In this stage, data are generated with people rather than on people. In this project, we engaged participants in member-checking, to ensure resonance with their experiences and we edited the text based on their feedback; (4) discovering system relations between our particular group and topic and other systems related to urban education; and (5) using system relation to explain findings. Being attentive to this methodological framing, in our analysis of interviews, field notes, and daily written reflections, we noticed that teachers were raising issues of social justice during the PD discussions. We then turned to the data and identified when such issues were raised and their alignment with the dimensions of the CoP that supported their willingness to raise and elaborate on these issues.

Findings

In this section, we share how critical issues of place and injustice arose during the group's time on Hog Island in the city where teacher participants worked, in their schoolyards and neighborhoods, as well as in post-summer PD interviews. We also discuss how the CoP-based PD designed around dimensions of mutual engagement, shared repertoire, and joint enterprise afforded those moments. Critical issues of place may have bottom-up origins, where something about the place in question generates memories and touches on sense of place that teachers then connect to larger social issues. They can also be top-down: larger patterns of injustice trigger a discussion of the local instantiation of that issue. These different origins also are reflected in our findings.

CPP themes

After reconstructing and synthesizing the data (stage 2 of Carspecken 2013), it became clear that issues of social justice and inherent power and privilege repeatedly arose in conversations with teachers, both in group and individual conversations. We engaged in dialogical data generation (stage 3 of Carspecken), elevating the voices of our teacher partners through interviews and other forms of conversation. In what follows, we present examples of discussions of social justice and critical issues of place with both top-down and bottom-up origins. We aligned these discussions with respect to four themes we identified in the data: place as a site of vulnerability, place as a barrier to educational access, place as inattentive or unresponsive to individual and/or group needs, and place as a source of Black joy and belonging.

A key component of critical ethnography also is connecting moments and patterns observed in interactions to larger system forces. All four themes described below are local instantiations of issues that affect urban education more broadly, and later in this section we include for each of the themes evidence of that connection to larger and specific systemic issues.

Place as a site of vulnerability

The city where teacher participants' schools were located and in which we conducted our PD was disproportionately impacted by the COVID-19 pandemic, especially in the early

days. Teachers reflected about this early on and throughout our work together. In one powerful moment, during a discussion of physical and social change over time on Day 1 of the summer PD on Hog Island, teachers brought up a drive-through COVID memorial that was erected in the late summer of 2020. Teachers described how powerful this display was, not only because the collective representation of lives lost to the disease was so enormous, but because the majority of the faces of those who had succumbed were Black. The following excerpt is but one example:

> Zaria: One more thing was the memorial pictures (from) two years ago. Beautiful but sad.
> Tiana: This community was hit really hard.
> Sarah: And that was just what was posted. One of my kindergarteners lost 7 people in her family.
> Elli: It was really powerful – every place on the island on both sides had 4'x4' photos of them (people who died from COVID) smiling, in happier times.
> Sarah: I had forgotten all about this until now (Field notes, Summer PD)

Another of the teachers had lost a parent to the pandemic. This was the first time that the group talked openly about the shared trauma that they and their students had experienced. In a later discussion, Sarah mentioned the intense emotional and social needs of her students, some of whom had to be left alone during the day as parents had to leave home to work.

Some of the teacher participants also noted that they felt physically vulnerable in their schoolyards. In conversation, several participants shared that they felt unsafe due to lack of secure fencing which prevents public access, the dangerous trash left behind on the grounds, dangerous dogs running loose through the space, violence occurring in the neighborhood, and vehicles speeding on streets surrounding the school buildings. In a post-program interview, for example, Sarah shared that:

> Going outside with them [students] always made me anxious. Okay, because they're running and everything, parents are driving cars, where we were, parents could come up there, turn that circle [to] get their kids, depending on if a parent was upset or not, you know, they're flying through there. - (Sarah, Post-Summer Interview)

But Sarah also created a counter-narrative to her observations of vulnerability: she saw her classroom as a refuge and as a place in which she could help to build equity through supporting her students in overcoming barriers and telling them "you deserve a safe place to be, we will learn to care for our learning home because we deserve this place to learn". Elli voiced a similar concern about her students' vulnerability when she said "…kids are the least protected demographic, less protected than pets…." (Field notes, Summer PD).

In our reporting of findings for each theme, we connect these local instantiations to systemic patterns, in alignment with Carspecken's critical ethnography methodology (2013).

Place as a barrier to educational access

An unexpected issue of social justice that arose and that highlighted the expertise that teacher participants brought to the CoP centered on conditions that their students faced getting to school each day. The discussion arose out of a mention of a language arts curriculum unit about the troubles that students in other parts of the world face when getting to school, such as a daily boat ride. While not a planned part of the day, this issue clearly was

salient to participants, and they brought their deep understanding of the lives of their students and their families, along with the challenges they face as we developed a collective understanding of what students' lives as they interface with formal education are like. One of the facilitators mentioned creating place-powerful learning (place-based education that purposefully addresses emotions) and said "Think about how much of their day and week is spent at school." In response, Sarah pointed out that their students also faced difficulties, such as "parents who don't wake up, are 'too high' and other heartbreaking reasons." Zaria noted that as a former student of this school district who had lived through childhood abuse, she recognized the signs of abuse and neglect and kept materials in her classroom, such as hair care and other personal grooming materials, to help her students. She also wanted others in the group to hear how important it was for her (and by extension, current students) to be able to come to school and learn about the world beyond. She believed that a teacher should not stop teaching those lessons that reveal aspects of life in the wider world and that widen students' perspectives beyond those based upon their own lived experiences just because these students have experienced trauma. "You can't stop giving them a view of the world while trying to help them deal with their home life." Sarah added that as teachers, they are responsible for teaching the whole child, and that you must help them learn school behavior—"It's like code-switching, you act one way here and then there is home." That is, the ability to learn and make use of language and engage in habits valued by their teachers and the school system itself, is more likely to provide access to the educational resources students need and deserve. Elli also commented that as teachers, they "… need to remind their students that they are agents of change, that they deserve access to resources and experiences, which communicates that they have power and agency." (Field notes, Summer PD).

Place as inattentive to needs

A social justice issue that arose in several ways was the lack of student access to the outdoors. As a group, the teachers saw going outside as beneficial, both because it enhanced science learning and more broadly as it served to support the socio-emotional needs of their students. This was especially important because teachers saw this as a way to address student needs which had been elevated by the COVID pandemic, with the lengthy school closures that had occurred. As Sarah said "go outside, play in the dirt, lay on the ground and watch the ants, there's just so much more to learning than reading, writing and arithmetic. Let's go outside, just breathe." (Sarah, interview, June 2022)

Two teachers in the group raised the issue of access to the outdoors in general and recess in particular. Kelly and Elli talked about how students in their schools were not allowed to go outdoors even for recess, despite district policies requiring such. During her pre-interview, Elli described her principal's "no recess rule" and during her school visit, Kelly also mentioned her lack of outdoor access as being framed as a safety issue by her principal. During the group's visit to their schoolyard, Kelly and Diana described how this change occurred and its effects on students:

> Kelly: We couldn't use the play structures because they were not cleaned for COVID. Then a kid got out of the gate. Then no one could go out any more.
> Diana: They were all inside and then they were crazy when they went outside. Then there were injuries and they had to do injury reports.

Later in discussion Kelly mentioned her principal's emphasis on "test scores and bell-to-bell teaching" and her perception that this had developed into an administrative stance that less recess equaled better test scores.

Elli reported that her school's principal had decided there would be no recess for any grade for the same reasons—COVID learning loss/test performance and perceived safety.

> The students don't have recess. They frequently have silent lunch. They only have specials, like twice a week, there is no time when kids get to experience, like, play, autonomy, socializing, which are all things that, like, are critical and normal.

She mentioned the same issue of student behavior, "I feel like the argument is, can't take the kids outside because there's conflict, [but] there's conflict because they never get to run around, like decide what they want to do with their bodies." Elli took this issue up with the group on the last day of the summer PD session, asking if a resource could be created to help educate administration on the importance of students being allowed outside for both learning and fun.

These conversations all grew out of an understanding on the part of the teachers that students were going to be a bit out of control when they hadn't been outside and therefore had been unable to learn the norms for appropriate behavior in these spaces. Additionally, it reflects a distinct sentiment that the lack of outdoor access was depriving students of opportunities for meaningful learning and just as importantly of creating positive associations with the school day. Also reflective of this issue is the fact that in a recent poll we conducted of teachers in the project ($n=29$), over 60% reported having no or infrequent recess at their school. Of those with recess, few had it in the outdoors.

In their interviews, Elli and Sarah talked about the failure of school to meet the needs of students in multiple ways. For example, Elli shared the following:

> Children…deserve to be afforded basic rights… And I feel like play is a human right for children… I mean, it's only one aspect of the prison-like conditions at my school. So, our bathrooms are locked. Kids are not allowed to go to the bathroom when they need to, they get two bathroom breaks a day as a whole class… How can you lock the bathroom? Like, how is that remotely defensible? And I thought it was just my school. I was like, wow, my principal's lame. But I've talked to other people. It's the same thing at their schools… everybody has to use the bathroom. And it's virtually impossible to focus on anything else when that [need] is not being met (Elli, interview, June 2022)

Sarah also likened her school to prison, focusing on how it was built with little consideration for the students who attend the school and that this neglect of their needs was widespread.

> Nobody is thinking about outdoor spaces. All they are thinking about is putting them in here and there. The walls are cinder block, it's like it's almost prison, like some of the pink colors are even prison-like. But it's not like a City [thing], "little-black-kids-we-don't care-about" thing, it is a socioeconomic issue, because when I worked in [another school district] which is 60-some-odd percent Caucasian, it is the same thing (Sarah, interview, June 2022)

Place as a source of Black joy and belonging

On the first day of the summer PD, we began by sharing personal narratives of place, an abbreviated version of de Carteret's (2011) collaborative place-storytelling. Participants shared their stories of Hog Island—coming to hear the city orchestra play at the band-shell as a child, first dates and proms, family reunions and church picnics, having their pets regularly accompany them down the large park slide. They described the feel of the grass under their feet and told tales of willow trees and falling asleep on warm summer nights. The park was clearly a place that was important to the city's Black community, and a place of Black joy—a place where they could find pleasure away from the White gaze (Lewis-Giggetts 2022). The participants who had grown up in the city and had childhood memories talked over, in between, and to each other, building upon what each said, spurring new memories that had lain forgotten. Sarah, an older member of the group, recalled how it had gone from a "gem to a slum, back to a gem" as management of the park had changed from the city to the state after the city's economic downturn.

However, this sense of belonging did not exist for all the city's parks. In an early interview between the spring and summer session, Elli expressed a social justice orientation toward the conditions of her students and school. One issue that she discussed was how outdoor spaces were used and the disparity between two parks; one of these was located in her students' neighborhood and the other farther from her school but which was not used by students or their families.

> I also wish that I felt like more empowered to utilize all these spaces. There's like a ridiculously well-maintained park one block away...from my wildly underfunded school. And it's gorgeous, like, I don't understand, and none of my students have been there… There's (also) Grove Park, where, you know, there's basketball equipment and play equipment and hugely popular like, everybody's there all the time. It's like, huh, so interesting. This park is clearly inviting for the neighborhood … that's right next to school is like, no one is feeling invited… I haven't been able to get permission to walk over there, it's literally a block away. Plus, like, there's pressure not to use the park that's actually attached to the school because of the things … like the play structure not being updated, and like there being trash and stuff like that around. (Elli, interview, June 2022)

She also noticed the difference in how the parks look and were maintained as well as access even though they are both situated near the school.

CoP as support for system connection-making

In addition to connecting to larger system phenomena, a key feature of critical ethnography is to examine local context as well. The project fostered the development of a CoP which became the place within which such salient contextual features were raised and cultivated. In the section that follows, we provide examples from our data of how we purposefully designed activities and positioned ourselves in partnership with participants with the three key CoP elements—joint enterprise, mutual engagement, and shared repertoire—in mind. Below we provide examples of how the project fostered a CoP and the teachers' uptake of and commentary which reflected these three elements.

Joint enterprise: developing commitment to learning in place and finding value in schoolyards

As noted earlier in the paper, joint enterprise refers to the common goal toward which members of a CoP work. For example, responding to the questions of why they were interested in the program in the program pre-survey, Diana wrote "The opportunity to collaborate with other science teachers to deliver engaging science instruction." Zaria responded, "I would love to learn new ways to teach outdoors and the benefits that it has on children." Sarah connected her goals to her existing science units: "The third-grade science curriculum has two units that are best taught outside or at least with an outside element… This PD will help greatly with being able to bring out the best in those units."

Since one of the researchers' goals going into this program was to foster a CoP that could support teachers in engaging students in outdoor science, we also asked teachers in the pre-program survey what the term "learning community" meant to them. Kelly wrote "A learning community means that we will be working together for a common goal. We will share ideas and listen to the ideas of one another." Tiana responded "A learning community can contain a variety of things. But certainly students, teachers and a wealth of learning items/tools." Zaria wrote "A safe space for everyone's learning style and levels of understanding of the content. A space where everyone has the opportunity to learn." Diana responded, "Learning community to me means that we all respect each other for our differences and are able to learn new concepts together through collaboration." There was a strong foundation of understanding from which we could build, with collaboration being a key part of a learning community in the teachers' eyes. In the spring PD, program staff consistently framed our work as collaborative, which the teachers readily picked up; engaged in personal asset mapping with teachers to represent the broad array of expertise we all had; and positioned our team as more knowledgeable about teaching outdoors and eager to learn from the teachers, who were experts on urban teaching and their students as they emerged from the pandemic. The work we did together in the spring was also built upon what we learned from their pre-program survey responses and provided the foundation for the continued work we did during the summer PD. In a very real sense, we asked them what they needed and cast these needs as the work of the community.

A key aspect of joint enterprise is diversity and complementarity of knowledge and experience. While there were multiple ways of participating in the CoP, all participants had expertise in one or more factors of the common enterprise of teaching science outdoors. One form of this was revealed by the personal asset-mapping activity we did during the spring PD, in which small groups of teachers shared what they felt were their strengths inside and beyond the classroom. These were recorded on a slide file which was shared and which the whole community could access at any time. Additionally, the work within the CoP privileged both taking on different perspectives and seeking out and leveraging students' interests, priorities and needs, and teacher participants shared the enlarged views they were developing as a result of our work together. An example of this perspective-taking, taken from an interview with a participants at the end of the spring PD, follows.

> ….At first I was looking at how can we plant, and I still want to do those kinds of things. But then I started thinking, How can we build models that affect the way the community views the school yard … perhaps we could go around the school and not only focus on a garden or anything like that, but beautifying the school area, but hanging up a model and telling the parents and the community, this is what we found in our community around our schools and build essential questions….So just really

taking my own experiences as a teacher …and placing myself in the shoes of the students.

Mutual engagement: attention to place through observations, mapping and picture-taking

As noted earlier, this dimension refers to culture-building activity within the community—different types of interactions which help to promote the development of a group of people into a community. Two key parts of the culture the PD sought to build were recognizing and elevating teachers as experts and building a space for collaboration. Norm-setting, personal asset mapping, and schoolyard mapping allowed for such culture building, and participants were comfortable sharing their thoughts with one another verbally and visually through pictures. What follows are some examples of activities that fostered mutual engagement.

According to post-spring session evaluations, the teachers in the program valued the time provided for small group work and knowledge exchange. The asset-mapping activity referenced above serves dual purposes. By sharing what assets all the CoP members, staff and teachers held—knowledge about content areas, pedagogy, community, and hobbies, we not only brought in multiple types of knowledge, but raised that multiplicity to an expectation of the community. Teachers reacted very positively to this exercise. Another small group activity that supported the development of community was having teachers share maps of their schoolyards. They described key features and generated questions that students might ask—highlighting both the diversity in the group and the differences. One anonymous evaluation respondent said their favorite part was "hearing other people's ideas and approaches to outdoor learning and teaching."

Supporting such mutual engagement continued in the summer session. During the first day of the in-place PD, the group shared stories of their experiences on Hog Island. These shared narratives provided a personal and contextualized sense of place that served to further develop the community. Diana wrote in a reflection from that the first day of summer PD that

> ….Being asked about my personal stories and experiences in a sincere environment affected my teaching because I can understand more how important it is for my students to feel a sense of belonging to open up more for the academics.

Another teacher in their first day reflection said that a part of the PD that was meaningful was "Allowing anyone to share their thinking and feelings." This inclusive nature of the group was intentional—the project staff positioned themselves not as experts but as members of the CoP with different experiences and knowledge. Elli in an email during the year, summed it up as "This year was tough in unexpected ways but the space y'all create and hold is a constant source of inspiration." (Elli, personal communication)

The maturation of this mutual engagement was evident at the end of the summer, when participants visited each other's schoolyards and shared their knowledge and expertise. The schoolyard visits provided opportunities for teachers to see their schoolyards in a new light as they received ideas and inspiration from others. Having worked collaboratively for some time, they were comfortable with their fellow teachers, enough to identify barriers to them using the schoolyard, both physical (poor access near their classroom), logistical (length of time they had to teach science), and systemic (resistance from their principals to teaching outside): Independent of the PD facilitators,

teachers sought out and received collegial support from their colleagues, and that support was meaningful. Prior to Kelly's schoolyard visit, she apologized to the group for having a "bad" schoolyard at her school. Yet when we visited her school on the last day of the program, her fellow teachers found many opportunities to teach the district curriculum outside, and identified spaces she could use in many different ways. In her daily reflection that day, Kelly said what was meaningful to her was "Seeing and hearing ideas for my outdoor space" and that "hearing the excitement of others about the space" affected her thinking about teaching and learning. These teacher-led conversations could not have happened on Hog Island, as being in place (the schoolyards) and the associated visuals and connections to the teachers' own practices was vital.

Shared repertoire: connection to place through tools, observations, and storytelling

As the CoP developed through practices of mutual engagement, a shared repertoire among the participants was also being formed. Key tools among this repertoire were observations, storytelling, picture-taking and sharing with comments and/or questions on WhatsApp. Teachers conducted short observations in their schoolyard or at their home in each of the four Spring sessions. These observations had two goals: to help teachers in place-making in their schoolyard and making a practice to be used in the summer familiar to them. The format was five minutes of observing directed by a prompt (e.g. "Stand or sit in your habitat and take 5 min to observe your surroundings. Focus on what you can hear. If you feel comfortable, close your eyes and listen.") and five minutes of journaling. Spring feedback from the anonymous evaluation made it clear that these observations were one of the favorite parts of the sessions. When asked what they liked best about the Spring, responses included "Exploring our outdoor space in different ways"; "How I connect with my school yard and what we can do to improve it"; and " ….It gave me the opportunity to connect with my school grounds in a different way." Observations were used during the summer, as well, to introduce investigations the teachers would be conducting. Diana pointed out that "I learned that I can reach erosion and weathering much more neater and cleaner by taking an observation walk and not trying to recreate an entire habitat." (Reflection Day 1).

Another tool that was important to the program, and especially salient to the social justice themes described above was storytelling. Unlike observations, which were introduced in the Spring sessions, narratives became a key tool in the Summer, on Hog Island. The kick-off activity at Hog Island was sharing stories they had of their time on Hog Island, which, as noted previously, is important to the Black community of the city. Storytelling was meant to help the community connect and/or reconnect to this place and to introduce the idea of storytelling for students in their schoolyards and communities. The complex history of the park mirrored the multifaceted challenges that the city had faced over the years and continues to grapple with. In discussing their relationship to a specific place, shared narrative served as an important and necessary cohesive factor in developing community within a CoP and in foregrounding their common identity. The process was meaningful for both teachers who already had a relation to Hog Island:

> Being asked about my personal stories and experiences in a sincere environment affected my teaching because I can understand more how important it is for my students to feel a sense of belonging to open up more for the academics. (Diana, Reflection Day 1)

Hearing from teacher participants who grew up in the city was also valuable for those who were not familiar with the place, and this included not only some teachers but members of the project staff as well:

Through the shared repertoire of observations and storytelling, teacher participants focused on their respective places in multiple ways and were encouraged to take different perspectives on those places. Both the focus on place and relationships facilitated the cohesiveness necessary to a culture that afforded raising difficult and potentially painful issues of social justice.

A CoP did develop among the teacher participants and facilitators in the spring and summer PD, with intentional facilitation by the program staff. From the beginning, a shared purpose of improving science teaching and working with students outdoors (joint enterprise) was a hallmark of the work. Through small group discussions and sharing their schoolyards through maps and visits, they developed mutual engagement and a culture that valued collaboration and raised up each member's expertise. Participants had a shared repertoire of tools used in the PD and to be used with students, including observations and storytelling. These dimensions together created a space for teachers to feel engaged, respected, and heard enough to raise issues of social justice from their personal and teaching lives.

Discussion

Our findings point to how critical issues of place and injustice arose during the group's time in the city where teacher participants worked: on Hog Island, in their schoolyards, and in their neighborhoods. We also have demonstrated how the CoP-based professional development designed around the dimensions of mutual engagement, shared repertoire, and joint enterprise afforded those moments and facilitated participants' thinking about the importance of place for their work as educators. We showed that critical issues of place were raised in bottom-up fashion; that is, something about place generated memories and touched on teachers' sense of place that they then connected to larger social issues. But our findings also reveal that such issues can be raised in a top-down manner: in our study, larger patterns of injustice triggered discussion of the local instantiation of a particular issue of place. Bearing in mind the central place of the community in place-based education, and the pedagogies that attempt to break the boundaries between the school and its community (Gruenwald 2005; Yemini et al. 2023), in this work we identified four place-centered themes in the data–barrier to educational access, inattention to needs, vulnerability, and source of Black joy and belonging. All of these themes echo the objectives of CPP in that they reflect approaches addressed by asking questions about what happened, what is happening and what could happen in a place which has been subjected to disruption, injury and colonization. In keeping with our use of critical ethnography, we share here connections between these themes from the findings and the questions which are inherent in these themes and are reflective of issues of social justice that teachers raised up, as well as of larger systemic issues.

Place as vulnerability. The experiences described by participants in our project are not unique but rather, reflect broader societal issues. For example, racial and ethnic minorities in the USA were especially hard hit by COVID-19 in the early days of the pandemic (Tai et al. 2021) as were urban centers, with children being especially affected because of their unique developmental needs (Kyriazis et al. 2021). Black children were also impacted

in ways tied to historical and racial disenfranchisement (Bogan et al. 2022). The changes brought by the pandemic, as well as other major social shifts, have fundamentally changed the face of teaching (Hill-Jackson, Ladson-Billings, and Craig 2022) and is having lasting impacts on Black and Brown children, not only in the USA but worldwide. In conjunction with calls to offer more opportunities to learn outside (e.g., Quay et al. 2020), attention should be paid to Trauma-Informed Practice (TIP), which is suggested in many countries to support teachers working with children who are exposed to threatening conditions (Mulholland and O'Toole 2021). The vulnerability we pointed to in the city where this study took part, which was expressed by the teachers, highlights the advantages of place-based education and TIP that emphasize safety, collaboration and sharing, empowerment and having voice and respect to diversity (Mulholland and O'Toole 2021).

Place as a barrier to educational access. The school district where this research took place had an attendance rate of approximately 75% in 2022, almost ten percentage points lower than before the pandemic. This reflects not only the challenges of attending school, but the lasting impact of the pandemic on families within the district. As the teachers shared, their students face many barriers to attending school and participating fully when they are there. Absenteeism (and the correlated student mobility) are symptoms of social and economic factors which create family instability (Welsh 2018; Nauer et al. 2014). In a literature review, Welsh (2018) identified social factors such as homelessness, residential instability and mobility, and foster care as contributing to absenteeism. In-school factors also led to students missing school, such as safety concerns, school climate, and exclusionary disciplinary policies. Other factors include transportation issues, weather, illness, and conflicting caretaker and employment responsibilities. It is important to note that in this city, as in many other large urban communities, what were once neighborhood schools are no longer; financial challenges have often resulted in school closures and students being bused to schools outside the neighborhoods in which they live. As a result, students are detached from their local communities and the school they attend does not hold the same social, cultural, affective, and even historical salience in their lives and in the lives of their family members. Some scholars note that this is a significant loss, both for individuals and entire communities. (See, for example, Good 2017.) With respect to absenteeism itself, Singer and colleagues (2021) also suggest looking at the issue of student absenteeism ecologically, with intersecting levels of influence on the problem. They offer that "policies that provide short-term relief from economic hardship and aim to reduce inequalities in the long-run must be understood as part of, rather than separate from, a policy agenda for reducing chronic absenteeism" (p. 2). Thus absenteeism is a social issue that has systemic root causes.

Place as inattentive to needs. While education has the promise to transform society and raise up students' personal and social development (Hooks 2014; Love 2019), instead it often reinscribes systems of oppression, including racism and sexism. Urban schooling has been historically inattentive to minoritized needs, even actively working against them. The scholar Bettina Love, for example, describes the "spirit murdering" of Black students that takes place in schools as "the denial of inclusion, protection, safety, nurturance, and acceptance because of fixed, yet fluid and moldable, structures of racism" (Love 2016).

The teachers in this study saw the lack of recess and access to the outdoors as one way that student needs were not met and harm was inflicted. Recess is a contentious issue across the USA. Urban, poor, and Black students are less likely to have access to recess than their White, suburban, rural, and affluent peers (Adams 2011; Roth et al. 2002). Though recess is powerful for children, improving both learning, social and behavioral outcomes (Parrot and Cohen 2020), and the district in which this study took place has a requirement for daily

recess, many of the participants report that their schools do not provide it for students. Often the reasoning is to increase instructional time (Blackwell 2004). In a recent poll of teachers in our project, over 60% reported having no or infrequent recess. Of those with recess, few had outdoor recess. Yet time outdoors in green spaces (even an open park with a few trees and bushes, similar to the schoolyards these teachers have at their schools) has many benefits for children that are relevant in the context of this study, such as improved cognitive functioning (D'Amore 2015; Dadvand et al. 2015); an increase in standardized math, English, and reading scores (Kuo et al. 2018; Wu et al. 2014), reduced symptoms in children with ADHD (Faber Taylor and Kuo 2009) and benefits for overall well-being (Murray and Ramstetter 2013), including reduced anxiety and stress (Wells and Evans 2003). Yet lack of access to these outdoor spaces are common in urban schools.

The elements of the PD offered in the project that were critical for these issues to be raised are contained within the COP framework. This framework guided our learning together with participants and using their rich life and teaching experiences to determine the direction of our discussions no less than our pre-planned activities. This was evident in what transpired both at Hog Island and the teachers' schoolyards. By tying activities to teachers' work and life contexts, and by having participants lead many of the discussions, we integrated previously planned and real-time aspects of the PD. The nature of the PD and the settings in which it occurred gave rise to informal, unscripted conversations during what we termed "walks and talks" when we moved from location to location as well as those which arose organically while we sat together on the ground or on portable stools while collecting data, discussing patterns in our observations, and identifying obstacles to instruction and other professional challenges. Part of the reason for such conversations was the safe and inclusive environment which contributed to the creation of a common language about principles of outdoor learning and about how outdoor learning can support science education in an educational system whose students are underserved. The important role of "place" has emerged in the two types of discourse.

Source of Black Joy and Belonging. There are well-established historical and modern barriers to Black people enjoying the outdoors (Finney 2014) in the USA, including Jim Crow laws and segregation, the historic association with lynching, and present-day harassment. Just in the last few years a White woman has called the police on Black birder Christian Cooper in Central Park saying he was a danger to her (Eigen 2022; Nir 2020). While out jogging, Ahmaud Arbery was chased down and killed by a group of White men (Fausset 2020). These, along with other types of interpersonal violence, can make the outdoors feel unsafe for many Black people. Hog Island acted as a counterpoint to that, as a place that was central to the Black community in the city, even having a role in the civil rights movement. Having these outdoor places that are central to the community, and where the community feels safe to be who they are, even celebrate their Blackness, is an important component to justice and thriving. We will return to this idea in the next section.

Our experience in this project was that participants arrived at each other's work sites (school, schoolyard, neighborhoods) with a more enlarged, assets-based view of these spaces. That represents a shift for participants which was in turn the result of the ongoing conversations, work within the CoP. This enlarged view didn't blind participants to the SJ issues which surrounded them (e.g., conditions of grounds, limited access for students), but rather allowed participants to see both promise and challenge. And the challenges they noted were not ones which they represented as unresolvable. A CPP perspective is aligned with such a double view and often serves as a first step toward setting priorities and taking action, i.e., reclaiming such spaces for the purposes of "educational reinhabitation."

This collaboration also established the beginning of a trajectory toward action on the part of participating teachers. We see evidence of continued development of such thinking about place in justice-oriented ways and of working within systems to enact justice-oriented science teaching and learning strategies. For example Sarah, who in the spring and summer identified her schoolyard as lacking trees, reached out to district partners and local and national non-profits to not only plant over 100 trees, but build garden beds and repair a hoop house on the school grounds. She generously shared her process with teachers in the following cohort. Kelly made efforts to educate her principal and the reset of the teaching staff in her building and purchased outdoor equipment that was available to all teachers to use with their students. She also recruited three teachers for the next cohort of the PD program. Elli worked closely with one of the project staff to research the district's recess policy and took action when she found that her school was violating the mandate that required recess.

To be sure, there are system-level issues common to large under-resourced school districts such as school closures, short staffing leading to last-minute assignment changes, and large class sizes which continue to have an impact on our participants. Zaria, for example, has since left the district, after being moved from one grade to another in the middle of the school year and experiencing the most challenging year of teaching she had ever experienced. In contrast, Sarah, who also communicated at length about her growing frustrations with classroom conditions and about her intent to move to another district, decided to stay and has subsequently led significant efforts to improve the structure of the school yard and its use to support teacher and student well-being and student learning, as noted above. Similarly, Elli, one of the other participants in this study, was removed from teaching science. Despite this unwanted move, outside of school time she has continued to provide outdoor learning experiences (for example, having students work in the gardens she had led the construction of two years previously on the school grounds); she has done this despite the lack of support from her building administrator.

Finally, we wish to highlight how, across the consecutive PD cohorts, we shifted from focusing on emphasizing disciplinary core ideas and scientific practices to putting the curriculum aside to focus on "critical pedagogy of place" that challenged us, as well as the project participants, to reflect on the relationship between the kind of education we pursue and the kind of places we inhabit. Gruenewald (2003) argues for a synthesis of critical pedagogy and place-conscious education, where critical pedagogy offers "an understanding of the social and political context of schooling and the potential for schools to contribute to social change" and place-conscious education that offers "an understanding of the ecological and cultural context of schooling and the potential for schools to contribute to the sustainability of communities and ecosystems." While a focus on critical pedagogy of place within a CoP does not undo the injustice that teachers encounter in their individual contexts, it does support them in the process of confronting disruptive ideologies and rein-habiting places that have experienced harm. Thus, instead of aiming to equip the teachers with toolkits and concepts, we listened and advanced step by step guided by their concerns, challenges and accomplishments to provide a more realistic and suitable collaboration.

Final thoughts

Education can occur in a variety of environments—at school, in neighborhoods, in community-centered spaces, and the like. One of the most important contributions of our work, therefore, is its focus on expanding teaching and learning beyond the school building and

helping teachers develop a mindset and then a set of strategies for approaching this as a core instructional goal. Part of that is making space for them to raise the issues they see in their schools and communities and connect them to broader patterns of injustice—city-wide and in the society as a whole. Knowing these issues—understaffing, school closures, lack of advanced notice about reassignment—while they occur in place, extend beyond that place. We hold, in fact, that place, particularly the outdoors, holds a salience and a stability which can serve teachers and their students well, both cognitively and socio-emotionally. Time outdoors in green spaces (even an open park with a few trees and bushes, similar to the schoolyards these teachers have at their schools) has many benefits for children that are relevant to urban students, such as improved cognitive functioning (D'Amore 2015; Dadvand et al. 2015); an increase in standardized math, English, and reading scores (Kuo et al. 2018; Wu et al. 2014), reduced symptoms in children with ADHD (Faber Taylor and Kuo 2009) and reduced anxiety and stress (Wells and Evans 2003). Yet ready access to these outdoor spaces is uncommon in urban schools for a variety of reasons (Patchen et al. 2022). Time—in the day, in the curriculum, and for professional learning—is a common barrier to teaching outside (Patchen et al. 2022) for educators, and the teachers in our project are no exception. Time for preparation in subjects which are part of high-stake testing often displaces time for recess and the outdoors, as we discussed in the previous section. Time to make the most of an outdoor learning experience-exploration, thinking, discussion (Brody 2005; Falk and Dierking 2000) is inevitably in tension with how large systems such as school districts are structured. The challenge, then, is how we help educators understand and enact such approaches, but also communicate with other educators and administrators so that they receive the kind of support they need for sustained implementation.

A CoP offers resources and opportunities for both teachers and PD facilitators, the latter who frequently are not a part of the community in which these teachers work and often live. These include the invitation to think about place in a different and contextualized way, to learn about issues of concern for participants and their students, and to design instructional supports that are responsive to these concerns. The knowledge and skills required to take full advantage of this potential, however, requires time and commitment to nurture. What we have demonstrated in this paper are the kinds of critical structures and processes which enable educators to develop an awareness of critical aspects of place upon which they can build for their own instruction and the importance of having a community of other teachers from whom they can learn strategies to take back time and place for their students.

In the Discussion, we noted the importance of outdoor spaces as ones in which members of the community feel welcome to experience the space and events taking place within it and to contribute their own knowledge to the learning that goes on in the space. Often, however, such places are ones where individuals do not feel welcomed, or even feel actively threatened, or where the knowledge they bring is not valued. For adults as well as school-aged children, such unwelcome places can be their classroom or school more broadly, or they can be other physical spaces such as outdoor parks, museums, theaters, and the like. Such experiences are a reflection of the idea of *rightful presence,* a principle originally used in the context of citizenship studies and sociology to describe the responsibilities of government, including places, spaces, and services, to the residents of a geographical area such as a city, regardless of citizenship (e.g., Vrasti and Dayal 2016). More recently, it has applied as a framework for thinking about strategies in and studies of justice-oriented science teaching and learning (Calabrese Barton and Tan 2018, 2020). As Calabrese Barton and Tan define it, rightful presence is "…legitimate and legitimized membership in a classroom community because of who one is (not who one should be), in which the practices of that community support restructuring power dynamics toward more just ends through

making both injustice and social change visible." (Calabrese Barton and Tan 2018, p. 619). We argue that keeping rightful presence centered in outdoor science teaching and learning work is critical for providing instruction which makes use of a critical pedagogy of place.

Declarations

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