Understanding the Role of *Place* in Environmental Education across Settings

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Abstract: This session explores the role *place* plays in environmental science learning of youth in formal and informal settings. Environmental education has failed to address the lived experiences and narratives of youth living in areas most in need of social, political, and environmental change; and little is known how or why youth might position themselves or be positioned as members of the complex ecology of our changing environments. These papers report on the role of place by looking at the way it is manifested in situated activity systems. We argue that place is socially (re)constructed by youth where we come to understand the relations youth develop to a place, and the ways in which youth position themselves and are positioned socioculturally, politically, and geographically. To illustrate how this plays out, we draw on a 'envisioning your future neighborhood' mapping activity, a community based program, 'GET City', that is focused on green energy issues, and an instructional unit, 'My Place in Puget Sound' to understand how youth make connections to *place* and are empowered to make decisions and changes in their local communities.

Introduction

With rising worldwide concerns about detrimental human impacts on the environment, it is becoming increasingly essential that we educate youth to both understand environmental issues and have the agency and expertise to solve these issues (NAAEE, 2004; Grass & Agyemon, 2002). However, environmental education is failing to address issues of environmental justice—especially around issues of race, social class, and power relations—that reflect multiple cultural perspectives, thus serving to reinforce dominant societal values and marginalize those groups of youth who are most impacted by the most pressing modern environmental issues (Agyemon, 2003; Grass & Agyemon, 2002; Lewis & James, 1995). Specifically, environmental science education needs to address the lived experiences and narratives of youth living in areas most in need of social, political, and environmental change. Literature in science education has acknowledged the importance of connecting formal science instruction with students' out of school lives (cf. McIntyre, Rosebery & Gonzalez, 2001). In so doing, environmental education may play a role in helping youth see the places in which they live, learn, play, and work as places in which they can enact positive social change. What is needed, therefore, is a way to connect environmental education with the places where youth live their lives and how places are constructed for and by youth has implications for the learning pathways that are available to them.

In this session we take a social justice perspective to challenge the implicit purposes and goals of environmental education and understand the power relationships that intersect the cultures of school, environmental education, and home. We also argue for a systematic understanding of the role that *place* plays in environmental learning of youth in formal and informal settings. In order to think about *place* as a construct, we draw from a spatialized critical social theory. *Place* is political and ideological because it is shaped from historical and natural elements (Lefebvre & Enders, 1976). It is also a medium through which culture is reproduced because of the way it is organized and experienced (Gruenewald, 2003b). According to Rodman (1992), *place* is also socially constructed which is determined by individual agency and forces beyond individual control. For the individual, places have multiple meanings in terms of physical, emotional, and experiential realities at particular times. Consequently, Wacquant (1995: 427) posits that places are understood as social entities where they are "*produced institutionally*, within ecological and technical constraints, by social and political struggles over competing uses of spaces, resources, and people."

This paper set explores the role *place* plays in environmental science learning of youth in formal and informal settings. Specifically, the papers explore how place, within situated activity systems, is socially (re)constructed by youth where we come to understand the relations youth develop to a place, and the ways in which youth position themselves and are positioned socioculturally, politically, and geographically. Moreover, we look at how the design of an instructional unit, called *'My Place in Puget Sound'*, connects Puget Sound science and action with youths' everyday lives and cultural practices. The *first symposium paper* looks at the social construction of place where youth from a community center, called Riverside Park Community Center, were asked to design a future map of their neighborhood. In this paper we argue that the positioning of the youth in their neighborhood is relative to their cityscapes (Nespor, 1997). Their relations with their neighborhood are

patterned in space and time, and are realized by the ways they come to negotiate their positions in spaces through resistance, agency, and/or affiliation; and the ways they make inaccessible spaces accessible. The *second symposium paper* examines how youth and their families in an after school, "voluntary" science/technology/social club, called *'GET City'* in a mid-sized Midwestern city, come to talk about energy issues, IT, and STEM energy related careers; and how the language they use positions them with particular roles and expertise. The analysis focuses on the intersecting discourse communities that play a role in how science and place are constructed. The *third symposium paper* examines the role of place and its implications in the design of an instructional unit where we provide youth with a context to connect Puget Sound science and action with youths' everyday lives and cultural practices. We examine the ways in which youth learn about issues in their local marine environment; and how they are empowered to take action by participating in civic activities, for example the Puget Sound 2020 Action Agenda, where students come to develop new or more nuanced understandings of issues in Puget Sound; and develop an awareness of applying multiple perspectives including scientific understandings, personal and cultural values as well as social and ethical concerns to understanding and decision making related to marine science and to marine-science-related societal issues.

Understanding the Role of Place in Situated Activity Systems

We use the construct of *narrative* to articulate an account of the construction of place. Specifically, we look at how narratives highlight or obscure certain social realities influence the construction of activity systems, and position youth in certain ways in environmental education. Building from Bruner's account of narrative cognition (1987), we define narratives for our purposes as socially shared accounts of human intention and action. In this account of social narrative there is an inseparability of character, setting, and action from a situational perspective.

Narrative can exist and influence learning at multiple levels. Therefore, we look at narratives from three planes of analysis: individual, social, and cultural, as well as the accompanying learning phenomena for each.

Cognitive ecology refers to the diverse terrain of influences on the way an individual cognitively makes sense of, or assigns meaning to, the world. For example, an individual may have certain narratives about herself as a learner (epistemological knowledge) based on cultural, gender, age, and class identities, and these narratives influence the way she acts upon the world (cf., diSessa [2002] for his notion of conceptual ecology). These "lifeworlds embody the multiple histories that give rise to experience and the interpretation of that experience" (Lim & Calabrese Barton, 2006). Situated activity systems refer to activity that takes place within the boundaries of a (socially constructed) place (Goffman, 1961). Individuals can "boundary cross" (Phelan, Davidson & Cao, 1991) as they move between activity systems, in each of which are embedded culturally-based narratives. We consider the social plane to be the space where individuals enact their personal epistemologies and where cultural toolkit elements set up lines of action in social interactions and in situated activity systems. As individuals come to places, they interact not only with each other but also with the cultural narratives and resources available in those places. As individuals move within places and perceive those places in certain ways based on their own cognitive ecologies, they *construct* places and fill those places with meaning (Casey, 1996). Cultural toolkits (Swidler, 1986) refer to the ideologies, technologies, and narratives that are uniquely present at a given historical moment. We consider cultural activities and toolkits broadly, to include resources from environmental education, environmentalism, school, ethnic group memberships, and religious participation. These toolkits then shape activities in certain ways and interact with an individual's own cognitive ecology. Narratives can exist at all three planes of analysis in the form of prevailing cultural narratives of environment, local narratives about places that shape activity systems, and individual narratives based on personal epistemologies and repertoires of practice (Gutierrez & Rogoff, 2003). Individuals who come to those places and activity systems bring with them certain personal narratives that shape how they perceive the activity systems in which they engage. This perception has influences on learning and engagement and is important for us to look at in terms of how to construct learning pathways for students that leverage their personal narratives and expertise. We also argue that individuals coming to environmental education can contest the prevailing ideologies within cultural narratives, and that we need to empower youth to do so. Looking at narratives across the three planes of analysis gives us a specific lens with which to ask, from a social justice perspective, by whose narratives, for what purposes, and with what consequences for learning does environmental education get shaped.

Paper 1: Ideological dimensions of place: (re)creating an urban area by *Giovanna Scalone & Philip Bell, University of Washington*

Introduction

From a spatialized critical social theory, place is political and ideological because it is shaped from historical and natural elements (Lefebvre & Enders, 1976). It is also a medium through which culture is reproduced

because of the way it is organized and experienced (Gruenewald, 2003). According to Rodman (1992), place is also socially constructed which is determined by individual agency and forces beyond individual control. For the individual, places have multiple meanings in terms of physical, emotional, and experiential realities at particular times. Consequently, Wacquant (1995: 427) posits that places are understood as social entities where they are "*produced institutionally*, within ecological and technical constraints, by social and political struggles over competing uses of spaces, resources, and people."

This paper describes the social construction of place where students from Riverside Park Community Center were asked to design a future map of their neighborhood. We argue that the positioning of the students in their neighborhood is relative to their cityscapes (Nespor, 1997). The students' relations with their neighborhood are patterned in space and time. For one student, her neighbor is a commercial company where her experiential reality rests on trucks running all day polluting her space with fumes, making it difficult to breathe; for another student getting to the downtown area means taking multiple buses that run at limited times, spatially isolating her neighborhood from the downtown area. These relations are realized by the ways that students come to negotiate their positions in spaces through resistance, agency, and/or affiliation; and make inaccessible spaces accessible.

In this study we asked two questions: (1) How is place socially constructed in the future map of the students' neighborhood? (2) In what way(s) do the students position themselves in relation to their (re)constructed neighborhood and how is their positioning relative to their cityscapes?

Research Design and Context

This study took place in a research setting in an urban center in the Pacific Northwest at a community center that we call Riverside Park Community Center. It was an environmental justice program for high school students. The Riverside Park community lines the banks of an industrialized river that was designated by the Environmental Protection Agency as a Superfund site in 2001, which means that it is one of the most toxic waste sites in the country. The river's pollution is but one of the many environmental issues facing Riverside Park. In addition, it is one of the few communities left in the city that is zoned for both commercial and residential use, which means that commercial companies can be physically located next to private residences.

The environmental justice youth program was sponsored by a local community-based non-profit organization. The goal of the program was to educate youth about issues in environmental justice, using the Superfund site as a context for learning. Classes were held at the community center after school once a week. In addition, the group performed community service every Saturday for 4-6 hours. The program ran for 12 weeks. There were 12 youth who consistently attended the program, ranging from freshmen to juniors. Two were African American, 2 were European American and Native American, and the rest were Latino. Isa and Gabriela were co-facilitators of the program.

The overall data for this study is from a cross-setting ethnography of environmental education. As participant-observers, we followed the youth from January to June of 2008 as they experienced environmental education in various settings. We collected digital photography and fieldnoted accounts of the instruction, interactions, and stories of the participants as they navigated through these varied settings. For this study, the data is from a mapping activity that the students engaged in class. The students were given a current map of their neighborhood and tracing paper was placed on top of it so that they may design a future map of their neighborhood. They were asked to think about what they want their future to look like. Eventually, this exercise will be used to help other children in the community center to map their neighborhood.

We analyzed the fieldnotes for episodes where we could see—through the instructional materials used, the discourse of the participants, or their actions—aspects of place being socially (re)constructed. These episodes were coded for in the data using first open coding (Strauss & Corbin, 1998), and then axial coding (Strauss & Corbin, 1998) to further articulate the categories within the episodes once they were identified. Working from the assertions that emerged through the coding, we then systematically looked for disconfirming evidence across the data set (Erickson, 1986). Finally, for each episode we identified and categorized as being relevant to (re)constructing place. This analysis forced us to look more holistically at the data set in order to understand the context around each episode, the processes involved in defining that episode, and how each episode fit in with the larger data set.

Findings

In this study we present findings from an analysis of the students' future neighborhood mapping activity and an analysis of our fieldnotes. We identified episodes of place being socially constructed by the students. A recurrent theme in our findings is the ideological dimension of place (cf. Gruenewald, 2003). We draw on Gruenewald's (2003) 'ideological dimension of place' as a construct to understand, firstly, how place is socially constructed in the future map of the students' neighborhood; and secondly, how students position themselves in relation to their (re)constructed neighborhood and how their positioning is relative to their cityscapes. Drawing from spatialized critical social theory, Gruenewald (2003) examines how spatial relationships shape culture,

identity, and social relationships. These relationships are, in turn, expressive of ideologies and relationships of power. We found that these relationships were realized in the maps that the students had drawn. The students' construction of commercial and consumption spaces in their future neighborhood could be indicative of the way in which space, which is society, is imbued with power relationships. In the reconstructed map, the students had made accessible for themselves spaces that reflect not only their cultural heritage (for example, the 'Mexican Plaza') bust spaces that express the interests of the upper class (for example, 'mansions') as well as sites for recreational activities which are inaccessible for the students, such as soccer fields.

Places reflect and reproduce social relationships of power and domination. The control of place by government and other social institutions, such as "Microsoft" and "Boeing" legitimizes and reproduces the authority of those institutions (Gruenewald, 2003). However, bell hooks metaphorical/material concept of marginality shows how place can be constructed as a space of domination and a place of hope (hooks, 1990) where the students have filled spaces on the map with cultural products, such as Chinese Downtown and Mexican Plaza. For hooks (1990) these spaces can be seen as a site for resistance, agency, and affiliation. It is at these sites that students may come to understand and recast their social positions through their experiential and material cultural conditions (Smith & Katz, 1993). In turn, we become responsible for place making.

Another theme in our findings is the ways in which the students see themselves navigating their future neighborhood. While their construction of spaces evokes ideological dimensions of place, it also illustrates how they are positioned in their community, neighborhood, and beyond. For these students' the mapping activity shows how essential sites of consumption are, such as malls; and how valued sites that are currently inaccessible become accessible, such as "Wild Waves". Spaces that invoke popular culture become a resource for the students to mark their identities and forge ties across their current and envisioned neighborhood (Cf. Nespor, 1997: 195). Students' ideational systems are juxtaposed with dominant ideational systems. This is manifested in the ways they make place through their identity and culture. For example, "Museum of Cris"; "Canada"; "SFC" (S's Freshman Court).

What is striking in the reconstructed maps is the positioning of the play spaces, for example the soccer fields to the businesses. While our data does not attend to the students' histories, it may indicate the value that students attach to economics and the role it plays in providing resources for themselves and their families. This, in turn, has forced us to look at the role place plays in terms of employment – for the students and their families. On several occasions the students made repeated reference to fast food establishments. For the students, these were indicators of employment. This especially stands out in the illustrations where in terms of time, students currently aspire to work at "Chucky Cheez" or "McDonalds", and in the future "Microsoft" and "Boeing". Here, capital becomes important when it is made available and activated in spaces. These constructed places also bear significance on students' identities (cf. Lim and Calabrese Barton (2006) notion of "lifeworlds")

Understanding sense of place can be seen as a political activity where it is about the politics of identity and local understanding (Aikenhead, Calabrese Barton & Chinn, 2006). Gruenewald (2003) argues that the lack of attention to space in education has obscured the role of citizens in the process of place making. It is, thus, essential that educators and students develop an analysis of how an economy functions through space, geography and social institutions. If educators and students are to understand culture in places where they live, they must explore the interdependent economic, political, ideological, and ecological relationships between places (Gruenewald, 2003).

Implications

This study is an attempt to understand how places are socially constructed by the students; and how they position themselves in relation to their (re)constructed neighborhood and how their positioning is relative to their cityscapes. Understanding why students draw on particular sites of consumption, constraint, and sites that provide resources for the students and their families requires an examination of the students' histories in relation to the neighborhood (cf. Nespor, 1997). The episodes in our data illustrate the economic, political, ideological, and social relationship the students have to their spaces, yet by analyzing the interactions around the mapping activity with a critical lens on the power relationships of place, and the social construction of place, we can gain insight into the students' relationships with their neighborhood and their positioning relative to their cityscapes. Gruenewald (2003b:626) discusses the social dimension of place as being a product of culture by means of one's experience of places that are mediated by culture, education, and personal experience. It is within this construct that place-based education allows students to reflect and unpack particular cultural meanings attached to place. Nevertheless, Gruenewald (2003b) maintains that little research has been done in documenting and explaining what youths' sense of place is and how it might matter in educational contexts. Gruenewald (*Ibid*) contends that as educators we need to develop connections with places where we are able to invest meaning.

Basso (1996: 72) writes that ideational systems around features of the local landscape become symbolically constituted, socially transmitted, and individually applied in a way that places flexible constraints on how the physical environment can (and should) be known, how its occupants can (and should) be found to act and, how the doings of both can (and should) be discerned to affect each other. Ideational systems are made

up of shared ideas, values, beliefs, rules, and meanings that are expressed through social institutions, and influence the ways on which places are organized. Youth adapt to their socially constructed places in culturally specific ways that can be interpreted as self-determinate. Ricoeur (1979 as cited in Basso 1996) maintains that ideational systems delineate a distinctive way of being-in-the-world. However, we cannot account for the ways in which youth construct their reality that reflects a personalized manifestation of a shared perspective on their human condition (cf. Basso, 1996). This issue needs to be addressed in future research.

For future research, it is also essential to account for and view sense of place drawing on the "visible particulars of local topographies, the personal particulars of biographical associations", and "the notional particulars of socially given systems of thought" (Basso, 1996:144).

Paper 2: "The Coal Plant Could Give People Jobs, But at the Same Time, It could Pollute the Air" Science learning as participation with and in a place by *Shari Rose & Angela Calabrese Barton, Michigan State University*

Introduction and Conceptual Framing

Framing learning as changing participation is a powerful step forward in documenting the goals of science education. Learning as changing participation has its history within sociocultural studies of learning (Lave & Wenger, 1991), but, at the same time it calls into question the complicated ways in which the outcomes and goals of learning are shaped by the relations of power and privilege that often constitute a community of practice as well as by other historical, political, social, cultural, and physical factors (Gutierrez, 2008).

A focus on changing participation calls attention to the role of place. How individuals value an activity depends, in part, upon the purposes and goals of that activity, its relationship to a place (including local knowledge and resources), and the relative positions of power of the agents within that place. Informed by cultural historical perspectives, we value *place* as a conceptual framework that helps us to understand the importance the relationship between the individual and the society and also the local and the global (Nasir & Hand, 2006). In other words, part of understanding how learning is mediated culturally and historically developing, is to recognize how structures and trajectories interact in place-based ways.

We work in out of school urban environmental education contexts. Despite recent calls to engage youth in socio-environmental decision-making (Covitt et al, 2009), science education more generally and environmental education more specifically, seems to have ignored its intimate and unique connection with the local community, marginalizing the role of place in education (Bowers, 1997; Gruenewald; 2003a, 2003b; Sanger, 1998; Sobel, 1993, 1996). Yet, place matters because it orients science learning in particular ways - it imbues the learning of science with certain expectations, practices, values, and materials. Furthermore, place matters in yet another way because it positions youth in unique ways toward science learning: How youth are positioned socioculturally, politically, and geographically shapes how and why students and their teachers might choose to engage in science or in how they assign meaning or value to it. This latter point is important because it underscores that by engaging in the knowledge and practices of science in embodied ways, youth (and their teachers) can also transform the worlds they traverse in ways that matter to them. This is especially important in the contexts in which we work because historically, environmental discourses have often existed in tension with the economic concerns of low-income families (Jones, 2008). Consequently, we know very little about how or why youth might position themselves as important members of the complex ecology of our changing world. We are particularly concerned about this issue from the perspective of low-income urban youth who are often positioned outside "power" discourses of their schools and their communities.

Research Questions

Our study merges two theoretical traditions – sociocultural perspectives on learning (i.e, Lave & Wenger, 1991) and critically oriented and place-based environmental science (i.e., Covitt et al, 2009) to better understand the Discourses, funds of knowledge, and hybrid practices (Gutierrez, 2008) that youth draw upon as they make sense of complex scientific content rooted in local placed-based controversy – that of a proposed new coal-biomass power plant. In particular our research questions include:

What salient Discourses and funds of knowledge frame how youth define an environmental problem, seek to acquire new information and take a stand in their community? How does explicitly incorporating the primary and secondary Discourses and a sense of place of urban youth into the environmental decision-making process affect how youth engage environmental justice?

Research Design and Context

Our study takes place in the context of a year-round community based program focused on green energy issues, "GET City," in a mid-sized Midwestern city. GET City is an after school, "voluntary" science/technology/social club for youth ages 10 – 14. GET City holds as it dual goals to foster deep and meaningful learning among urban youth in the areas of advanced information technologies (including data acquisition, management and

analysis tools and communication tools) and the science and engineering of green energy issues.
GET City adopts a place-based, youth participatory action research (PAR) approach which focuses on community science issues related to green energy in the urban center. The program provides opportunities for urban youth to investigate science issues in their own community and actively participate in change making processes in their own place as "community science experts" (Calabrese Barton & Tan, accepted). The PAR approach provides an opportunity to closely observe 1) how youth leverage their identities as they try to participate in community science projects as community science experts and 2) in what ways a place-based community science project could facilitate and support youth learning as participation.

The study took place while the youth engaged in a 4-month investigation into whether their city should build a hybrid power plant, a highly contentious issue. In addition to gathering more traditional ethnographic forms of data such as program documentation (i.e., attendance, lesson plans, etc.), fieldnotes recorded daily and separately by both authors, and interviews with youth and club staff, we also conducted interactive conversations and worked with youth to create products that reflected their curiosities and desires. We folded these products into our database as well, offering us an opportunity to engage in content analysis of a range of student works.

Data analysis involved multiple stages and levels of coding (Strauss & Corbin, 1998). We developed coding schemes on those aspects of GET City, which seemed to be particularly relevant to engaging youth in energy issues and in advanced IT. We have paid attention to the quantity and quality of youth and family engagement, including documentation of which youth and their families participate in what ways, we have honed in on how science meanings have been negotiated by youth and their families, and on how youth and families talk about energy issues, IT, and STEM energy related careers, noting how the language they use positions themselves with particular roles and expertise.

Findings & Significance

Our findings reveal that "place" facilitates and constrains participatory learning by the contextual scaffolds it gives rise to. By contextual scaffolding we reference the situated cognitive stance that the contextual dimensions of meaning making are deeply entrenched in the social, historical, geographic, and political relations of which it is a product (Brown, Collins, & Duguid, 1989). For example, although environmental stewardship discourses framed youth's decision-making process, concerns about the need for jobs, the rising cost of fossil fuels, and our reliance on electricity to provide refrigerated food, framed the questions youth asked and the information they sought to acquire as they struggled to decide what was best for their community. The value of scientific information took on significance as youth attempted to figure out how they might reconcile these sometimes competing and conflicting Discourses.

To unpack how we view the ways in which place frames participatory learning, in our paper we first describe how place brings out tensioned dialectics in doing community-based science, including science versus place, knowledge versus action, and scientific versus cultural, and how these tensioned dialectics shape the process by which youth worked to transform (and were supported to transform) their participation. For example, explorations of the power plant positioned the youth by virtue of their role as community members and students as legitimate stakeholders. Youth were empowered both to negotiate the ways in which they engaged with the science activities and to use the science knowledge and skills they gained to bring about strategic changes to the place they inhabit through hybrid practices.

Second, we also discuss how these tensioned dialectics served as contextual scaffolds in support of participatory science learning because of the dialectical hybrid discourses and practices they afforded. Through hybrid practices, the youth reconciled tensioned dialectics in science learning by authoring their learning: what they learn (place vs. science), why they learn (knowledge vs. action), and how they learn (scientific vs. personal/cultural). In particular, participating youth engaged at least three reconciling "hybrid" discourses (Green Jobs, Save our Mountain Tops, and Earth and Jobs in the Balance), which span a trajectory for how science, community and environmental justice were positioned with respect to each other and their role in that reconciliation. By explicitly positioning youth Discourses within the power plant debate, youth challenged the either/or questions that framed the debate and expanded the role of environmental justice in the process.

We conclude by looking more closely at how these tensioned dialectics shape the process by which youth expanded their epistemic, place and science identities through the dialectical, hybrid science practices they support.

Paper 3: "My Place in Puget Sound": Leveraging youths' sense of place in ocean sciences education by Carrie Tzou, University of Washington Bothell

Introduction

This work builds off of ethnographic research and findings that argue for *place* as a construct for connecting youths' lived experiences and science learning (Authors, in press). In previous design-based research that has

attempted to leverage students' out of school expertise into the design of science instruction (Authors, 2007), we have struggled with how to seriously connect this expertise with deep learning of discipline-specific content. In this project, we take *place* as a construct that connects disciplinary learning around the ocean with students' sense of place. We have designed a 4-week curriculum called *My Place in Puget Sound* that begins with students situating themselves in their local neighborhoods, communities, and cities, and then seeing the connection between those places and the ocean (by which they all live in close proximity). They do this through a mapping exercise in which they first map out their neighborhoods, then overlay topographical maps and maps of waterways so that they can see how water might drain from their communities out to the ocean. This is entryway into learning about watersheds, wastewater treatment, and environmental impacts of pollutants in the Puget Sound. The unit empowers students to make positive change in their communities by engaging them in an action project, in which they propose and carry out a community-based project that affects one aspect around the health of Puget Sound.

Methods and Data

We situate this work under the umbrella of *design-based research* (Collins, 1992, Author 2004), in that we are attempting to understand how to design a personally consequential science curriculum that highlights children's everyday cognition at the same time that it engages children in systematic, authentic scientific practices. Under the umbrella of design-based research, there is wide variation in the theoretical perspectives, methods, settings, and purposes of the work. Author (2004) outlines some major distinctions between the types of design-based research families in the literature, ranging from developmental psychology (c.f. Brown, 1992), to cognitive science (White & Frederiksen, 1998), to cultural psychology (Cole, 1996). Bell also discusses design-based research that integrates ethnographic methods into design research (Stevens, 2000).

The data from this study come from observations of three classrooms enacting the *My Place in Puget Sound* curriculum. Field notes of classroom activity and talk were taken and transcribed, and artifacts from the students were collected.

Findings & Significance

Preliminary analysis of the data indicate two major findings: (1) that students need support noticing the places where they live-especially as these places pertain to relevant features that might have environmental impacts (businesses, green spaces, topographical features, etc), and (2) mapping is a powerful way to connect students' sense of place with the science learning. This work has significance addressing environmental education for social justice, as poor youth of color disproportionately live in the most polluted urban areas (Bullard, 2002) and access to environmental education that empowers youth to make positive change in their local environments is a civil rights issue that should be a focus of their science education.

References

Aikenhead, G. S., Calabrese Barton, A., & Chinn, P. W. U. (2006). Forum: Toward a politics of place- based science education. *Cultural Studies of Science Education*, 1, 403 – 416.

Basso, K.H. (1996). *Wisdom Sits in Places: Landscape and language among the Western Apache.* Albuquerque: University of New Mexico Press.

Bowers, C. A. (1997). *Culture of denial*: *Why the environmental movement needs a strategy for reforming universities and public schools.* Albany, New York: State University of New York Press.

Brown, A. L., & Campione, J.C.(1998). Designing a community of young learners: Theoretical and practical lessons. In N. M. Lambert & B. L. McCombs (Eds.), *Howstudents learn: Reforming schools through learner-centered education* (pp. 153-186). Washington, DC: American Psychological Association.

Brown, J.S., Collins, A. & Duguid, S. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18(*1), 32-42.

Bruner, J. (1987). *Actual minds, possible worlds*. Cambridge, MA: Harvard University Press.

Bullard, R. (1990). *Dumping in Dixie: Race, class, and environmental quality*. Boulder, CO: Westview Press.

Calabrese Barton, A. & Tan, E. (accepted). We be burnin: Agency, Identity and Learning. Journal of the Learning Sciences. (Accepted Sept. 2009).

Casey, E.S. (1996). How to get from space to place in a fairly short stretch of time: Phenomenological Prolegomena. In S. Feld & K.H. Basso (eds). *Sense of place* (13-52). Santa Fe, NM: School of American Research Press.

Cole, M. (1996). *Cultural psychology: A once and future discipline*. Cambridge, MA: Belknap Press.

Cole, M., & Engstrom, Y. (1993). A Cultural-historical approach to distributed cognition. In G. Salomon (Ed.), *Distributed cognitions: Psychological and educational considerations* (pp. 1-37). New York: Cambridge University Press.

Collins, A. (1999). The changing infrastructure of education research: Issues in educational research. In E.C. Lagemann & L. S. Shulman (Eds.), *Issues in education research: Problems and possibilities* (pp.289-

298). San Francisco: Jossey-Bass.
Covitt, B., Tan, E., Tsurusaki, B., & Anderson, A. (2009). Students' Use of Scientific Knowledge and Practices When Making Decisions in Citizens' Role. Paper presented at the annual NARST Conference, Anaheim, CA.
diSessa, A. (2002). Why "conceptual ecology" is a good idea. In M. Limón & L. Mason (Eds.), *Reconsidering conceptual change: Issues in theory and practice* (pp. 29-60). Dortrecht: Kluwer.
Elmesky, R. (2003). Crossfire on the streets and into the classroom. *Cybernetics and Human Knowing*, *10*(2), 29-50.
Erickson, F. (1986). Qualitative methods in research on teaching, pp. 119-145 (up to "Data analysis and reporting.") Monograph reproduced from M. Wittrock (Ed.), *Handbook of Research on Teaching*. New York: MacMillan.
Goffman, E. (1961). *Encounters: Two studies in the sociology of interaction.* Indianapolis, IN: The Bobbs-Merrill Company, Inc.
Gruenewald, D. (2003a). The best of both worlds: A critical pedagogy of place. *Educational Researcher, 32*(4), 3-12.
Gruenewald, D. A. (2003b). Foundations of place: A multidisciplinary framework for place-conscious education. *American Educational Research Journal, 40*(3), 619 (636 pages).
Gruenewald, D. A. (2004). A foucauldian analysis of environmental education: Toward the socioecological challenge of the earth charter. *Curriculum Inquiry 34*(1), 71-107.
Gutiérrez, K. D. (2008). Developing a sociocritical literacy in the third space. *Reading Research Quarterly 43*(2): 148-164.
Gutiérrez, K., & Rogoff, B. (2003). Cultural ways of learning: Individual traits or repertoires of practice. *Educational Researcher, 22*(5), 19-25.
Holland, D. (1998). *Identity and agency in cultural worlds*. Cambridge: Harvard University Press.
hooks, b. (1990). *Yearning: Race, gender, and cultural politics*. Boston: South End Press.
Jones, V. (2008). *The Green Collar Economy*. NY, NY: Harper Collins. Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.
Lefebvre, H. & Enders, M.J. (1976). Reflections on the Politics of Space. *Antipode,* 8(2), 30-37.
Lim, M. & Calabrese Barton, A. (2006). Science learning and a sense of place in an urban middle school. *Cultural Studies of Science Education, 1*, 107-142.
Nasir, N.S., & Hand, V.M. (2006). Exploring sociocultural perspectives on race, culture, and learning. *Review of Educational Research, 76*(4), 449-475.
Nespor, J. (1997). *Tangled up in School: Politics, Space, Bodies, and Signs in the Educational Process.* Mahwah, New Jersey: Lawrence Erlbaum Associates.
Phelan, P., Davidson, A., Cao, H. (1991) Students' Multiple Worlds: Negotiating the Boundaries of Family, Peer, and School Cultures. *Anthropology & Education Quarterly, 22*(3) 224-250.
Pinar, W. F. (1991). Curriculum as social psychoanalysis: On the significance of place. In J. L. Kincheloe & W. F. Pina (Eds.), *Curriculum as social psychoanalysis: On the significance of place* (pp.165-186). Albany: SUNY Press.
Rodman, M.C. (1992). Empowering Place: Multilocality and Multivocality. *American Anthropologist, New Series,* 94(3), 640-656.
Sanger, M. (1998). Sense of place and education. *Journal of Environmental Education, 29*(1), 4-8.
Smith, G. A. (2002). Place-based education: Learning to be where we are. *Phi Delta Kappa, 83*(8), 584-594.
Smith, N. & Katz, C. (1993). Grounding Metaphor: Toward a spatialized politics. In Keith, M. & Pile, S. (Eds.), *Place and the politics of identity* (pp. 67-83). New York: Routledge.
Sobel, D. (1993). *Children's special places: Exploring the role of forts, dens, and bush houses in middle childhood*. Tuscon, AZ: Zephyr Press.
Sobel, D. (1996). *Beyond ecophobia*. Great Barrington, MA: Orion Society.
Strauss, A. & Corbin, J. (1998). Basics of Qualitative Research. California: Sage Publications.
Swidler, A. (1986). Culture in action: Symbols and strategies. *American Sociological Review, 51*(2), 273-286.
Wacquant, L.J.D. (1995). The Ghetto, the State and the New Capitalist Economy. In Kasinitz, P. (ed.), *Metropolis: Center and Symbol of our Times* (pp. 418-449). New York: New York University press.
White, B. Y., & Frederiksen, J. R. (1998). Inquiry, modeling, and metacognition: Making science accessible to all students. *Cognition and Instruction, 16*, 3-118.