Habitus, Social Fields, and Circuits in Rural Science Education

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Abstract:

Schooling and science education are embedded within larger socio-cultural, political and economic contexts, influenced by global flows of capital, labor, ideas, and images. In this article we consider the ways in which ethnography traces the web of interactions (circuits), in a rural community and the ways that science inquiry was associated with character education. Our discussion examines the relationship between social fields, habitus, and meritocracy under new and ever-changing neoliberal conditions. These macro-level forces play out in everyday practices in the community and reveal schools, as well as science education, as sites for struggle.

Keywords: Meritocracy | Neoliberalism | Character education | Science Education

Article:

In science education, efforts to understand learning as a socio-cultural construct are often framed within the classroom and focused on the coordination of meanings *in the moment* between teacher and student, or students with their peers. Yet, the process of instruction and learning within a classroom is shaped through larger historical, socio-political, and economic forces that stretch out far beyond the classroom, extending through space and time. *Tangled up in Global Networks of Practice* recounts the macro- and meso-level contexts that influence the reproduction of science education within a rural math, science, and technology elementary school. In this forum, three of us—all ethnographers in education—came together to discuss the ways that science education at Horizon School extends into the small rural community of Riverton, North Carolina and the larger global economy.

In this conversation we consciously interrogate one another concerning our assumptions about the purposes of schooling and encourage each other to consider how such a study could push research in science education in new directions. What surprises us is how much dialogue the research by Heidi Carlone and her co-authors generated as we reflect on our own experiences of

conducting ethnographic research and on the theoretical implications of Nespor's (*1997*) "tangle" with its spatial and temporal dimensions. Below, we engage one another in a discussion that revolves around three main questions:

- How does one conduct this kind of ethnography, an extended case study, which takes into consideration the web of connections among science education and the communities in which it is embedded?
- In what ways does the discourse of neoliberalism frame ideas about "character education" and meritocracy in the community of Riverton?
- How do we understand the ways that an "elite" education in science, math, and technology is played out in a rural community, where class differences are silenced?

In the following sections, we take turns in a discussion about these questions as they relate to social fields, meritocracy, and the ways that science education is connected to neoliberal economic conditions. We invite Carlone, Kimmel, and Tschida to join our discussion on ethnography of science education and other aspects of the tangle of schooling in the rural southeast.

Understanding "field" in Riverton

Carol

First, I want to acknowledge the ambitious undertaking of this research and the challenge of fitting a community-based study into the length of a journal article. What Heidi and her co-authors have achieved is typically reported in monograph-length ethnography. We have very few models of this kind of research in science education that take into account how the science classroom and school are situated within multiple contexts, and that captures the rapidly changing economic situation of the rural southeast.

Lorie

This article is fascinating for several reasons. First, in this rural area cultural struggles and resolutions are so different in tone and dynamics from the struggles in urban schools. Second, the positive way in which seemingly contradictory forms—science education, which is usually open-ended and critical and character education, which is presented as authoritative and conservative—are combined is very unusual and compelling. Similarly, the use of Pink's (*2005*) liberal business-oriented critique of education, and the way these are applied to rural reforms, lend a new perspective of how science education functions in a rural community.

Wes

It is to the great credit of Heidi and her co-authors in their study of the Horizon School that they think about the work within the school as part of a larger social, historical, political and

economic context. One of the key findings for me of this research is the irony that while Horizon is meant to be a math science and technology elementary school there seems to be as much public attention on moral character as there is on math and science.

Foley (*1990*) is one the first educational anthropologists to take the tradition of setting local work within a larger context from cultural anthropology and applies it to an educational context. In his work, *Learning Capitalist Culture*, Foley looks at race, gender and class relations within the local school in a small south Texas border town. He looks at how race, gender and class not only affect school performance and educational outcomes, but how these relations are themselves the specific product of the town's history and how that history itself is part of the larger political economy of the United States. One of the interesting results of his work was that while the larger civil rights movement in the United States contributed to local Mexicano people's political success, the Mexicano political movement was mainstreamed and did not end up having all that much impact on local Mexicano people's economic control of economic resources. This reality is also part of the school reality in that many Mexicano kids still tend not to do that well in school and do not tend to go on to good universities and higher paying jobs; thus, social reproduction continues in south Texas.

But as the global economy has gotten more complex, other models of ethnography have come to the fore that situate the local within the larger context. Appadurai (*1996*) articulated one of the best-known models, where he suggests that we must look at a complex web of global "flows." These flows of labor, capital, ideas, images, etc. overlap in different quantities in different places and so locations are more complexly influenced by the global in the current era. Nespor accommodates Appadurai's model with his notion of circuit and argues that circuit is also analogous to Bourdieu's notion of the field (Nespor *1997*, p. 39). I'm wondering if Heidi could speak more about how capital was distributed across this community and the ways that it might be influencing local performances of education in Horizon School.

Heidi, Sue, and Christina

It is difficult to know, with the methods we used (primarily newspaper analysis and interviews with parents, teachers, and the principal) whether or not different pockets of Riverton or even Horizon School were affected differently by global economic pressures and political discourses. We read Wes's comments here, taken up later by Lorie, as a concern about the monolithic portrayal of the global and the local performances in our study. We address this concern more directly below.

Carol

In my own research with American Indian women as undergraduates in science (Brandt *2008*), I gradually became aware of the ways that class and social mobility crept into our interviews, leading me to understand how meritocratic notions of education structured the experiences these young women had with schooling. Using Bourdieu's (*1990*) notion of field has really opened up

a new way for me to consider that the school and science education can be a site of struggle as Heidi and her co-authors mention.

Certainly, as the students in my study considered their career in science, they confronted the stark economic realities of reservation life, the difficulty of finding employment in rural communities, and the dynamics of class differences that relegated American Indians to the lowest wage earning jobs. All the participants mentioned how their parents struggled economically; parents and their daughters viewed college as a path to a professional career and economic stability. One participant, Jennie, spoke perceptively about her realization of the few opportunities for women of color in her small rural community that bordered the reservation. She recounted how one day as a server in her small town restaurant, she realized that the other women she worked with held this same job *for decades*. Already 3 years passed as a server and she knew there was a chance that this, too, could be her fate if she did not continue her college education. For Jennie, however, the field of the community college that bordered the reservation contrasted radically from the field of the Research University to which she transferred. She was suddenly cast into a location where the social and cultural capital that was valued at the community college was no longer recognized on the large university campus.

Lorie

While I agree that context—or field—is essential, this article goes only so far in telling the large, contextualized story that we get little continuous sense of the actors. It is a little hard to tell how much of the "grand narrative" resolution is a story told by the researchers rather than by teachers or parents. For example, the principal must have been key in mediating between community priorities and science/math/technology goals and visions. She is mentioned through quotes, but how consciously did she lead the resolution of conflicts into this hybrid solution? And what was the role of the researcher/writers in creating this solution? Would it have evolved without the authors' roles? The researchers' roles as change agents or mediators (or whatever) are not separated out (nor are other people's) so that we can see the dialogues, conflicts, and resolutions that happen at the micro-level, leading to the grand narrative of creating a hybrid character education-science school.

Also, what role did the teachers play in creating this vision and/or acting it out? Were they change agents as well, or were they following the directives from their in-service education (presumably done by the researcher)? Similarly, how do teachers' personal values, individually and collectively, relate to the conservative views of the parents and town? Were teachers varied in their stances? This town is stated to be near a university town. Did teachers take different views on heritage and character education than each other and than the townspeople? Were all teachers local people or did some (as is common) come from more sophisticated towns or the local university town? Did their origins affect their views on heritage and science education? Did some of the teachers hold values which conflicted with the provincial, Christian, and/or

conservative values of the town? What role did productive conflict play in the process, if any? Or were conflicts kept covert?

The roles played by parents and community are perhaps most clear, for which I commend this study, since few researchers bring these groups into the study. However, the presentation of the townspeople is monolithic. It is assumed that all are conservative and hold certain views. Were there mini-dialogues among teachers and parents, or among parents? Were these kinds of interactions noticeable?

Heidi, Sue, and Christina

Lorie raises some great questions here. Here, we respond to three different points she raises: (1) the role of "consciousness" in the local production of science at Horizon Elementary School; (2) the mini-dialogues that might represent more nuanced (less monolithic) views of the townspeople and the actors at the school; and (3) the meaning of "conservative" discourse.

First, Lorie wonders how much of this hybrid science/character education solution was one created by us (the authors) and how much of it played into the consciousness of the principal, teachers, and/or townspeople. Following an ethnographic tradition, our goal was to understand the *implicit*, taken-for-granted meanings of science at Horizon. Our examination of the ways the school promoted itself and got promoted in newspaper articles, recruitment advertisements, brochures, and Open House parent nights uncovered a crazy marriage of inquiry science education and character education. We are unsure if this marriage was intentional. These two forces met, with interesting and intriguing results. The two narratives (inquiry science and character education) received nearly equal weight in our interviews and newspaper analysis, even without our probing in those directions.

Did the principal recognize these two discourses as important aspects of the school? Yes. She put in place "character education" curricular programs and "inquiry-based science" curricular programs before we entered the picture. She elicited Heidi's help with the inquiry-based science strand. Did she intentionally create a character education/inquiry science school? We are not sure. As a longtime citizen of the community, she knew enough about the context to know about the community values, history, priorities, and struggles. As someone who fashioned herself as an innovative educator and with pressure to present the school as "something different" (but not *too* different), she valued curricular programs that were not enacted elsewhere in the county. It is hard to know how much of this was intentional.

And yet, for us the question of the "intentionality" of the marriage is not the most intriguing aspect of the case. The more interesting question is, "Why science education and character education? How come *these* two discourses?" This is such an unlikely combination, no? Especially since the "character education" program was so traditionally enacted with external rewards for "good character" and explicit, teacher-directed lessons about good character traits. So, we focused our analytic efforts on peeling back the walls of the classroom and school to

make sense of this unexpected marriage. We did so by taking the character education/inquiry-based science education curricula as "point[s] of entry to the study of economic, cultural, and political relations shaping [those curricula]" (Nespor *1997*, p. xiii). If the readers get to the end of this manuscript thinking that the marriage of character education and inquiry-based science education (an initially startling combination) makes a bit of sense given the larger historical, economic, cultural, and political forces bearing down on the school, then we have achieved our goal.

This is why, while interesting and insightful, Lorie's second point about us ignoring mini-dialogues among the actors that might represent divergent views, does not concern us as much. Understanding the practices, dialogues, and contestations that went into producing the local meaning of "science" and "character" at the school (i.e., Lorie's request) warrants a different lens, data collection methods, and analytic tools. Interestingly, the kind of analysis Lorie is pushing for (understanding the cultural production of "science" in local settings) is much more in line with the kind of analysis Heidi typically conducts (e.g., Carlone and Webb*2006*). But, in this article, we pushed ourselves to embrace an analytic lens more aligned with cultural studies scholars (e.g., Giroux *2006*) who take seriously and help explain how macro-level forces work themselves into everyday practices. The result here may be a slight tilt toward the overly macro. This is a critique we freely accept, since we view so much of the work in science education to be overly focused on the micro.

In voicing her concern about us glossing over the possible differences and contestations happening among teachers at the micro-level, Lorie wonders if all of the teachers held the "provincial, Christian, and/or conservative values" of the town and if all teachers were "local people or did some…come from more sophisticated towns or the local university town?" Lorie's questions here prompted us to reflect on and be cautious about how we use the notion of "conservative" discourse in our paper. We emphasize here (as much as a reminder for ourselves as for Lorie and for our readers) that "conservative" discourse does not only mean a politically conservative discourse or religious discourse. Though it may contain political and religious threads, it should not be juxtaposed with a more "sophisticated" and less "provincial" discourse, as conservative discourse exists as a grand narrative potentially shaping everyday practices and meanings across geographic locations in the US (small towns, rural counties, suburban cities, and urban cities). Further, conservative discourse is multi-faceted; it is about, among other things, cultural preservation, celebrating the "good ol' days", maintaining the status quo, buying into the Protestant work ethic, promoting authoritarian views of morality, and embracing rugged individualism and meritocratic notions of progress.

To sum up our responses to Lorie's queries: First, we were not examining "consciousness" in the production of the inquiry science/character education themes because we were interested in the implicit meanings that emerged in the promotion of this very innovative school during this very tumultuous economic moment in history. Second, we were less interested in how these inquiry science/character education themes were produced by, contested over, and negotiated by the

local actors (a more micro-lens) and more interested in understanding the ways more global level discourses worked their ways into the school's curriculum (a more macro-lens). Third, Lorie's questions about the representativeness of conservative viewpoints across the teaching staff cautioned us about using the concept of "conservative" to imply more provincial, less sophisticated viewpoints as this discourse exists as a grand narrative affecting everyday practices across time and space.

Carol

I agree that details about how actors from different social groups intersect within the school and community are vital. Yet, I would like to understand more of how these social actors are positioned differently within the social space, or field. I'm wondering how social and economic class is part of this differentiation in Riverton. It seems we are missing part of the story that might not have been evident through the town newspaper. Where is the underclass here? You mention that jobs were recently lost due to the loss of manufacturing in this community. Did these people leave or if they stayed, where are their children in the school system?

Heidi, Sue, and Christina

We can say fairly confidently, based on census data, that the people who lost jobs planned to stay in the county and the school system. However, we think you are right, Carol, when you say that we might be missing part of the story not represented in the town newspaper. Our analysis of the newspaper articles enables us to get at the ways "dominant" meanings filter into the school, meanings which may not be meanings shared by the underclass. Whose voices are represented in the town newspaper? Who writes letters to the editor? Who reads the paper? Perhaps these are not voices of the underclass, but we were reading the "official" record that, by definition, leaves people out.

At the same time, it is bothersome that the African–American, low-income, and Spanish speaking population are underrepresented throughout. However the question of why that is the case is another study.

Wes

Heidi and her co-authors use Nespor's notion of "networks of practice" to think about what is going on at Horizon School. For Nespor, these "networks of practice" are what he calls "circuits." As we have seen above the idea of circuit implies a certain fluidity and movement in social space but as I said above Nespor himself sees the idea of circuit to be analogous to Bourdieu's notion of field. Social interaction always takes place within a social field for Bourdieu (*1990*). One can think of the field as a theoretical space where different types of interaction and competition might go on. A school is a field but the school can be part of a larger field such as the field of a town or locale. Fields are overlapping and hierarchical. Within a field, social actors take up different positions with different concentrations of the various forms of

capital. Bourdieu defines capital as the social, cultural and economic resources that individuals and groups have in a social space. How much and what kind of capital a social actor has will influence the way that social actor interacts within that field. Further, their interaction will be influenced by their habitus…their "feel for the game" and Bourdieu says social actors then are conscious but they to some extend "shoot from the hip" when they engage in social interaction (Bourdieu *1990*, p. 66–69). These are critical parts of the notions of networks of practice, circuit or field that is somewhat missing in their article. There are unequal distributions of the various forms of capital among the social actors in Riverton and Horizon and that unequal distribution of resources in the social space affects how and what social actors do.

Nespor, Foley and Bourdieu then give us theoretical tools to say more about what seems to be going on in Riverton. Horizon School is a social field, but the social field of the school is itself part of a larger social field, which is Riverton, *and* as Heidi and her co-authors point out, Riverton is part of a global social field. The first thing we need to recognize is that the positioning and interaction that Heidi so nicely describe in the paper and in the school *are in fact* the interactions of the local elite. The teachers, administrators, librarians, business leaders and government officials are the ones in the community with the greater concentrations of cultural and economic capital and as such have great more opportunity to act within the social field in ways that will be to their advantage. These individuals (who are the only ones in Riverton that we hear about in the article) are the elite of Riverton. As Bourdieu also points out, the elite dominate the public discourse and it is rare that the lower social groups are able to get into the discussion. So the form of democracy we have is one where the elite social groups get to discuss and argue out their various positions (Bourdieu *1984*). Perhaps class played out in subtle ways. I'm wondering if Heidi can look back to her experiences with teachers and the school to see how that might have been expressed.

Heidi, Sue, and Christina

Wes's point here touches on, in part, Lorie's concerns above—the monolithic portrayal of the townspeople. In some sense, yes, the meanings portrayed in our manuscript do represent a rather one-dimensional perspective. As we explain above, that is what happens when you read the public "official" discourse, which indeed could have been dominated by the local elite. If we stray from our paper's thesis and analytic lens a bit to focus on Wes's and Lorie's concern about the monolithic portrayal, we did interview parents from a wide range of socioeconomic backgrounds, all of whom presented meanings of schooling (i.e., the importance of character, manners, "acting right") that aligned with a character education perspective. Further, the parents in our focus group (all of whom had jobs in manufacturing or whose spouses/partners worked in manufacturing) talked about the ways middle school teachers could "recognize" the Horizon students based on their good behavior and manners (versus their critical thinking, inquiry skills, problem-solving, or other academic behaviors). In other words, the data we have do not "push back" much on the themes of schooling for the development of "good" character. Again, this is

an example of the power of conservative discourse, a discourse powerful for its ability to travel across time and space.

Once again, however, you all are asking questions about how the meanings at Horizon got produced and/or how the meanings played out. In this manuscript, we provide a reading of the context, not the micro-level social interactions and practices that reproduced and/or contested meanings implied by the global context.

Neoliberalism, character education, and meritocracy

Carol

As we are discussing field, I'd like us to consider how meritocratic notions of schooling are folded into the creation of Horizon School. It seems that this school was created out of a social field for particular community purposes. McNamee and Miller (*2004*) argue that school boards, college-educated parents, and teachers view schools as meritocratic institutions where all children have equal opportunity to achieve excellence in their education, and consequently move ahead economically (e.g., get a good paying job that maintains and/or increases their class standing). Yet, for meritocracies to be fair students must have equal access to the cultural and social capital they need to be successful; classroom conditions within and across schools must be equivalent for all students. To advance those who have a "natural ability" and intellectual competence, the essential elements of meritocracy include a level playing field, the drive to excel, and an ethic of hard work (McNamee and Miller *2004*).

But the "field" is far from being level, as we discussed above and as Bourdieu (*1986*) has argued, access to capital (cultural, social, and economic) is unequally distributed in schools, as it is in the larger society. "The actual American educational system slants the field to give the best chances to those who are already advantaged; advantage and winning are just as circular as the long-acknowledged cycle of poverty and failure" (Brantlinger *2003*, p. 191).

Brantlinger also (2003) points out that *even if* schools were truly equal, that meritocracy is antithetical to a just approach to education. Dependent upon the best and the brightest rising to the top, a meritocracy is reliant upon competition, a philosophy that is aligned with neoliberal notions of the aggressively successful, self-determined individual. "Merit thinking" about winners (in relation to "deficit thinking" about losers) has shaped American schooling. In this paradigm, those who fail in a meritocracy are cast as having inadequate drive, a poor work ethic, deficient character, or more simply stated: they lack the "right stuff." I'm beginning to see how character education might be linked to the ways that science education plays out in Horizon School. Typically science is cited as a way to make not only our national economy more competitive, but individually, science is viewed as a stepping stone to professional careers. Heidi, how you are seeing character education in light of the larger business community?

Heidi, Sue, and Christina

We see *strong* links between Horizon's character education curriculum and the portrayals of the workforce in the newspaper and elsewhere. For example, all of the county's and local businesses' promotional materials touted the great "work ethic", "good values", "diligence", "loyalty", "integrity", "compassion", and "fairness" of the local workforce. County promotional materials explain that "good life and good business go hand in hand." At the same time, the newspaper celebrated Horizon students' "perfect attendance" awards at school, the creativity of a micro-society where students had responsibilities and jobs like they would in the adult world, and proper dining etiquette and table manners. In the newspaper, "good character" in Horizon's curriculum was described in much the same way as "good workers" in the county's promotional materials: it meant being on time, having integrity, good manners, patriotism, respect, and responsibility (see Table 1 in Carlone et al., this issue).

Wes

This idea of meritocracy is directly connected to the ideology of individualism that currently dominates education and is a product of neoliberal forces. From research to policy to the daily enactments of curriculum through pedagogical practice, so many of us assume that individuals are making free and unfettered choices and that institutions are also like persons in that they make similar free and unfettered choices. This ideology is very powerful and I would argue central to managing the contradictions of political system that is built on the notion of equality and equal opportunity and an economy that is premised on the notion of "social differentiation" and the unequal distribution of resources (Bowles and Gintis *1986*).

Educational institutions, in capitalist democracies, because of the above point, are in an extremely contradictory position. On the one hand, educational institutions sort people. So they make sure that the children of the affluent get the "cultural capital" they need to go on to become affluent adults and the children of the poor go on to get the skills they need to take their place in the low-paying service sector or to be unemployed (Bourdieu *1998*). And it is further the function of education as an institution to make sure people feel like they got what they deserved, that the children of the rich are intelligent and hard working and that the children of the poor are lazy and not very bright—again this seems to be consistent with why character education at Horizon School is closely aligned with science education in this social context.

Heidi, Sue, and Christina

Carol and Wes, your comments about meritocracy provided us good discussion about further implications with linking character education and inquiry-based science education. Meritocratic ways of thinking perpetuate myths about getting ahead; those who work hard and "have the right stuff" get ahead. "Good people" get ahead. We worry that perhaps because Horizon placed inquiry science as an "add-on" or "perk" of the curriculum (i.e., with most of the interesting science occurring outside of the curriculum), might that have also meant that "good behavior" led to "good science" (field trips, Friday science electives)? This is one leap away from "good

people get to do good science." This is troubling, no? This mindset obviously does nothing to flatten the historically enduring elitist hierarchy of science; in fact, it may solidify it. Carol hints at this same worry below.

Lorie

There are some interesting philosophical and political questions implied, too, about the hybrid character science created. I commend this science, first of all, as a fellow applied science educator who works with school community gardens (Hammond *2001*). Yet, I am also aware that while community action by students in the form of food drives are celebrated at this school and by the community, there must be community actions which would be viewed as threatening, however philanthropic. For example, if farmers combine their land use between agriculture and nature trails or duck preserves, there are often issues raised about things like pesticide use. In other words, are the real conflicts that emerge between the interest of farmers, conservationists, or other interested parties raised as part of the science curriculum of the school, or would they be avoided by the teachers? Some case studies of how specific teachers approached these kinds of issues would be very useful. I cannot help but think that many of the debates which inquiry science tries to tease out, in understanding situations from many points of view, would be controversial and would not fit the notion of "character education" proposed herein. In other words, I am not completely certain that science education and character education are congruent as represented by Heidi and her colleagues. I can see how service learning fits with character education, but that is only one aspect of science education.

Carol

I'm more skeptical about the merging of character education and science instruction. How are students socialized into having the right "character" to participate in science education? I wonder if the character education described in the Riverton newspaper and school curriculum is directly related to meritocratic ideals of schooling. Kennelly (*2009*) asserts that the ideal citizen within character curricula focus on the constant need to be "self-regulating and self-scrutinizing" (p. 133). There is an array of cultural forces that position students in relation to the state, a reminder that schools "police" and discipline students to shape the kinds of behavior that are desired of youth through character education.

Ironically, both the forces of democratization and globalization espouse greater individual freedom and opportunities for all. Arnot (*2009*) contends that liberal democratic notions of the social contract are couched within sets of relationships: the individual in relation to society, as well as the person in relation to government. Liberal ideals view the role of education as one in which schools help students (citizens) develop skills and talents, to better their lives via social mobility and through their participation in meritocratic institutions.

Elite schooling, class differences, and science education

Lorie

This brings up another question I have. I noticed how Horizon school was considered by some community members to be “elitist.” What do Americans mean, anyway, when they label things “elitist?” I have seen quality educational experiments labeled this way on numerous occasions. I have seen it happen many times that a school which decides to take its own direction, to be Spanish bilingual or a magnet school of some sort, and like Horizon Elementary, is then labeled “elitist” even though it is within the public school system and everyone can attend it. I am curious how other schools in the district were affected by the decision of the district to make this one a site of science/math/technology. Do some schools get less hands-on science as a result of this decision (now being defined as the “basics” schools)? Or does this school provide a model, which others can copy? If the former, I wonder what the equity effect of this charter school is on the district as a whole. Does its existence lead to many science/math/technology children from all circumstances being able to come to this school? What about the ones left at the other schools? Is there any chance that strategies tried successfully at this school be seen as copy-able in other schools? If not, what kind of science do children at other schools get?

Wes

In Heidi’s article, the ethnography in fact focuses primarily on the local elite and those elite represent different class fractions, i.e., business leaders, politicians, school officials, librarians, journalists. One of the things we are seeing in this article is the struggle of these different class fractions as they work to enact their vision of how Riverton and Horizon ought to respond to the conditions of globalization. These responses are, of course, shaped by habitus, and therefore, people have a feel for how to interact. It should be pointed out because different elites come from different social backgrounds, the responses to the current situation will be potentially contradictory and definitely in conflict with each other. It seems to me that one of the things Heidi and her colleagues are seeing is the conflict between these different groups of elites and that is perhaps why there is as much of a discussion of character education in the local newspaper and there is less about science and science education.

Lorie

Another way of putting these questions is this: if subjects, once considered basic to a good education (i.e., science, math, and technology) become the “special” subjects taught at a certain school, then how are they affected as part of the curriculum at other schools? By not defining science as basic, but rather as a frill (a well-made argument in the article), the implication is that science would be taught little in a school, which does not emphasize this frill in its program design. Is this situation made worse or better at other schools because of the existence of Horizon School? What are the majority of district or county children, especially those of color or living in poverty, getting as science education? What about children with special needs? Can they come to Horizon? The same question applies to English learners.

Heidi, Sue, and Christina

First, we can safely say that, there is very little inquiry-based science (or science in general) happening in this county and the surrounding counties in the North Carolina Piedmont (Jones et al. *2003*). We are also not sure if science has ever been a core subject area of the elementary curriculum, given the historical meanings of elementary schooling focused on reading, writing, and mathematics.

However, Lorie's question about the impact of Horizon School's focus on science on other local schools is interesting. One of the things we noticed in the newspaper analysis was that there was a lot of competition between schools for print. The competition was so pronounced, in fact, that 1 week we would see an article about a canned food drive from Horizon, and the next week, there appeared an article about a canned food drive at Franklin Elementary (pseudonym) down the road, and still the next week another article about a canned food drive at a third school, Garfield Elementary (pseudonym). We know that, from the perspectives of Horizon's principal and teacher leadership team, there was pressure to differentiate themselves from the other schools to keep growing (or at least maintain) student enrollment. However, other schools likely felt pressure to "keep up" with Horizon, too, because Horizon, as a magnet school of choice, pulled students from other schools' populations. The Horizon staff, interestingly, expressed frustration that the other schools were beginning to create micro-societies and science Friday electives, and adopting inquiry-based science kit curricular materials, which they viewed as "copycat" behavior. So, yes, we think Horizon's existence did push the other schools' curricula to an extent.

We now wonder, with the advent of fifth-grade standardized testing in science (taking effect after these data were collected) how Horizon is positioning itself within the county with regard to science. Are they serving as a resource for other schools or is this competition now more pronounced than ever?

Carol

This question about the elitism in schooling was in my mind as I read this article. It made me think about the interests of middle-class parents in schooling and how the educational system is one way to maintain class standing for the elites in a community. In his account of a school as a social space, "a knot in a web of social practices" (p. xiii) that extends far beyond the school walls in both time and space, Nespor (*1997*) teases apart a conflict among school administrators and students' parents. One premise fundamental to Nespor's ethnography is recognizing the parents' interests in the school as a location for an accounting of their child's standing through grades and test scores. "Parents saw schools as accounts of how kids matured and took their places in society (i.e., the school sorted them into appropriate paths and futures) and as an accounting mechanisms (producing grades and test scores) to explain and legitimize the sorting" (p. 31–32).

This notion of schools as complicit in the cultural reproduction of inequality—even in seemingly egalitarian rural communities like Riverton—contradicts long-held American ideals where schools are essential to economic opportunity. After all, the prevailing mantra of science education for the last two decades has been "Science for All." Education as the doorway to improving one's standard of living is a dominant feature of our national ideology. Yet, Brantlinger (*2003*) concurs with Nespor that schooling serves the purposes of those in power: "The educated middle class, who are primarily in control of schooling whether consciously or not, consistently arrange school structures to benefit children of their class" (p. 189).

Heidi, Sue, and Christina

Yes, and we would say that magnet schools like Horizon are likely one institutional structure that allow an educated middle class to choose to benefit their children. Magnet schools provide an illusion of choice that may not be viable for non-mainstream families; e.g., the working poor and/or the non-native English speaking families.

Wes

Finally, this raises the question of agency and the opportunities for groups and individuals to act given these forces. This is one place where I find myself at odds with Heidi and her colleagues' otherwise very interesting analysis. They find in all of this, opportunities for agency. For instance they see the commodification of Riverton as political struggle: "We argue that, not only does this protection of seemingly bygone ways of doing business make sense, it represents Riverton as a site of political struggle—struggle over the meaning of what counts as a "good life" and "good business" in the face of market fundamentalism pervading the current global context (Giroux *2005*)" (p. 14). And they see the local struggle over the definition of priorities in the school as an opportunity: "Science with character, then, represents a novel outcome at Horizon, one with transformative potential" (p. 39).

I am much less optimistic than Heidi and see much of what they discuss as the struggle of local elites over the declining local resources they face within the context of globalization. It is indeed a form of agency in the face of global powers but it is more shaped by the global forces than they see it and it is only the local elites who have this room to move and I suspect that the difference in capital between elites and non-elites is growing in this period.

While I am less optimistic I do not want to suggest a focus on agency is not warranted or useful. In his work on American Indian elite students, Brayboy (*2005*) shows how agency can work at an individual and collective level. In Riverton, as elsewhere in America, it is the very fragmentation and individualism in the culture that tends to lead to the greater social differentiation and increased inequality among social groups. There is agency and opportunity for change, but often it is a change that does not lead to a greater social good.

Carol

In rural communities, community ideals and the notion of the collective are often promoted over the individual for the greater social good. Is it agency when students act in their own interest, or in this rural community, when they act in a cause for others at their own expense? Is the relationship of science education and agency in this rural community any different from what happens in urban contexts?

Heidi, Sue, and Christina

Wes, it is interesting that you bring up your less optimistic lens. We had similar kinds of discussions when writing the article, asking ourselves "Where are the cracks of opportunities here?" Sue, in particular, was most adamant about finding these cracks, and we found them because we looked for them. We did feel as though our analysis kept turning up reproduction and character education used for control, but Sue pushed us to persist in looking for the cracks of opportunity. Sue's insistence here kept us from treating character education as a monolithic reproduction, looking for ways it may have served as a creative force. And, we believe we found some legitimate examples. We argue that we must view global forces and local struggles over priorities as opportunities. Otherwise, we are right back to embracing the overly deterministic lens of the Bowles and Gintis (*1986*) era (Giroux *2006*).

Conclusions

Lorie

This type of ethnography is much needed, and should go on. However, I ask questions because I also feel that as critical researchers, we need to problematize issues such as the ones raised in this discussion. It is important to ask whether an "elite" science/math/tech school in a district makes the instruction in these subjects better for all children, or whether it increases the gap between those with social, intellectual, or economic capital, and those without. It would also be fascinating to analyze how classroom science is taught in this hybrid form, with character education, to see how this approach tweaks the boundaries of the ways in which science inquiry is conceived. By definition, inquiry sometimes unearths things that are not comfortable to the status quo. How would this kind of inquiry be handled in Horizon School?

Wes

In math and science education, it is rare that we take the larger social context into consideration when thinking about teaching and learning. Yet, all of our theoretical work points to the fact that the identities that we have, the ways we interact with others and the work we do—all central to knowledge building and learning—are indeed shaped by the larger social forces and the contexts in which we find ourselves. Therefore, we have to thank Heidi and her colleagues for opening up a space for this conversation. If there are limitations to their work that we have pointed to, those limitations are in fact the larger limitation of science education and not just these authors. Opening up the discourse about context is not easy because there are huge pressures and

constraints keeping us from opening this discussion. From our funding bodies to the journals we write for, what we talk about in theory is often legislated out in practice. It is undoubtedly the case that some of the contextual data that Heidi does not have is most likely due to these discursive constraints. It will take a concerted effort on all of our parts to continue the work here to look ethnographically at the ways teaching, learning, and knowledge building are themselves the products of larger social forces that have traditionally been seen to be outside the ken of science education.

Carol

The work by Heidi and her co-authors is powerful as it reminds us of how our work in schools is structured by larger social, political, and economic forces. This research opened up my awareness of what we want for our students in science education is often based upon middle class values of time, employment, aspirations, and careers. I argue that an exploration of class along with other aspects of "difference" (e.g., race, ethnicity, and gender) is critical to understanding the ways that youth participate in science. Just as Pollack (*2004*) claims we are "colormute" about race, I contend that we are also "classmute" about the economic disparities that characterize the daily lives of students as they move through institutions of schooling. I see this ethnography as pushing science education to look beyond the classroom and school walls to consider larger political and market forces as they play out locally under the guise of science education.

Heidi, Sue, and Christina

We are energized by the discussion here and look forward to working in Carol, Wes, and Lorie's perspectives as we continue to pursue our scholarship in the critical tradition. We agree with them about the difficulty of opening up what counts as "relevant" contexts to consider when embarking on a critical ethnographic case study. In this article, we pushed to understand macro-level forces on schooling and the struggle that ensues, and yet many of our colleagues' questions focused on local actors' (more micro- and/or nuanced) interactions, meaning-making, and/or contestations. We analyzed the effects of a shifting economy on the school curriculum versus looking at the effects of the curriculum or Horizon on different social classes.

For us, the interesting aspect of the article is not necessarily what it says about the actors (though those stories are critically important and there for the mining), it is what it says about science education. In examining the ways macro-level forces find their ways into schooling, we better understand the limits on science education reform. This study should prompt raised eyebrows at any "one-size-fits-all" science education reform proposal. As Wes pointed out so well above, "flows of labor, capital, ideas, images, etc. overlap in different quantities in different places and so locations are more complexly influenced by the global in the current era." We do not think science education research has paid enough attention to the macro- to know how these flows

differently affect science education in different geographic regions, so how could we possibly expect a similarly enacted science education reform across time and space?

And yet, we are insistent on looking for potential in this story because we embrace Giroux's (*2006*) notion of schools as sites of struggle. This is not a story simply about global forces bearing down unproblematically on a rural elementary school. In this story, even though we had to dig for the cracks of possibility, we uncovered an implicit meaning of science (science with character) that, as Lorie also noticed, had some definite possibility. Different communities have distinct resources to draw on to create and make meaning of science education. This rural community, for example, drew on history, farming, natural resources, religious values and place that had consequences for how science education was enacted. In doing so, science education became something novel. We agree with Carol, Wes, and Lorie, however, that the actual potential for individual actors remains to be seen; we need further investigation. Off we go!

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