JOURNAL OF RESEARCH IN SCIENCE TEACHING VOL. 38, NO. 8, PP. 847–859 (2001)

Capitalism, Critical Pedagogy, and Urban Science Education: An Interview with Peter McLaren

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Received 1 June 2001; accepted 12 June 2001

Introduction: The Questions That Frame Urban Science Education

We have prepared this discussion of capitalism, critical pedagogy, and urban science education in conversation format in order to keep problematic the contextual realities of privilege, power, and knowledge in urban settings. The conversation begins with a discussion of key issues in education in general and then leads into a critique of the relationships among capitalism, science, and education. This more general beginning is important because it enables the argument that we are not looking in the right places in science to bring about meaningful reform based on social justice. Only when we see the problems in science education as problems at a societal level, which always mediates the other problems, can we aspire to any hope. Indeed, McLaren makes three key claims here: (a) that the relationship between capitalism and urban education has led to schooling practices that favor economic control by elite classes; (b) that the relationship between capitalism and science has led to a science whose purposes and goals are about profitability rather than the betterment of the global condition; and (c) that the marriages between capitalism and education and capitalism and science have created a foundation for science education that emphasises corporate values at the expense of social justice and human dignity. We conclude this conversation by describing the implications that critical pedagogy might have for productively confronting these three main issues in urban settings.

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A former elementary school teacher, Peter McLaren is a professor in the Division of Urban Education, Graduate School of Education and Information Studies, University of California, Los Angeles. He is the author and editor of more than 30 books on critical pedagogy, the sociology of education, and critical ethnography, including *Critical Pedagogy and Predatory Culture* (Routledge, 1995), *Revolutionary Multiculturalism* (Westview Press, 1997) and *Che Guevara, Paulo Freire, and the Pedagogy of Revolution* (Rowman and Littlefield, 2000).

Calabrese Barton: Urban science education raises several challenges for science educators because of the vast inequalities in terms of resources, social privileges, and capital control which play out in inner-city settings, in general, and inner-city schools, in particular. You have been writing about education and inequality for over 20 years. In particular, a major theme of your work over the past two decades (in particular in your book *Life in Schools*) has been to understand teaching in cultural, political, and ethical terms with the goal of building strong links between the classroom and our efforts to build a more just world through critical pedagogical practices and analyses. From your critical theory perspective, what would you say are the key issues with which the science education community must come to terms in urban settings?

McLaren: For me, the key questions about urban science education raised by a critical approach include: How is the social practice of science organized? Or of education organized? How are social classes constituted through these practices? How are social practices constituted *prior to* these practices, since capital works to limit and control intellectual and scientific activity? What kind of scientific knowledge or school-based knowledge has the greatest exchange value in society? How is labor-power—the selling of one's ability to work—implicated in the reproduction of scientific knowledge? What type of science has ownership of the most prestigious research capital? What happens to scientists or the science teachers who have become alienated by the corporate community?[1] Since the discourse of science relies on the world outside of science, it needs to be analyzed critically from the social, cultural, and historical determinations that influence it.

The Relationship between Capitalism and Education

Calabrese Barton: The problems of science education are just a small subsection of the problems endemic to education and capitalism. It seems to me, then, underlying your key issues, or rather your key questions, is the claim that school science reform has aligned itself to the imperatives of the capitalist marketplace rather than the goals of a democratic socialist struggle. In other words, science education has become more about presenting students the science they need to fit into society rather than about educating students about how they might produce, use, and critique science to work with and transform society. Going to school does not enhance one's chances of success because even if everybody was learning something, schooling is still about stratifying students.

McLaren: Yes. Perhaps the best way for me to expand upon these points you raise is to share with you and your readers some serious concerns I have that shape my present perspective on education in general, science in general, and then urban science education in particular. The first point that I want to make is about the relationship between education (generally) and capitalism. Our society's unfettered capitalism has become a dangerous prejudice in the U.S. and worldwide and has impacted our social, political, scientific, and education structures. Everywhere you look today, learning is being marginalized by its stress on capitalist accumulation. Scientific research, education, and capitalism serve each other so intimately that it is hard to think of one without the other. No where is this more dangerous than in economically and politically oppressed communities. While capitalism, having emerged from the shadow of Marx's incubus with the fall of the former Soviet Union, continues to make good on its promises of providing considerable consumer advantages available to large numbers of people in advanced industrial nations, it also functions systematically as a form of global pillage. The neoliberal economic politics of the developed capitalist states (marked by the elimination of the public sector, the imposition of open-door free trade policies, and a draconian curtailing of state subsidies,

compensations, and social protections) have created staggering disparities in wealth among populations in advanced democracies. They have also intensified and expedited the flow of surplus values from poor countries into the U.S., leaving unprecedented levels of poverty, starvation, disease, and homelessness in those very countries that the U.S. ostensibly attempts to assist (McLaren & Farahmandpur , in press; McLaren, forthcoming).

Calabrese Barton: Yet some argue that education will become more efficient and productive in a fiercely competitive marketplace and that this is just what urban school systems need. Indeed, this relationship between capitalism and education seems to be the central thesis in the Bush administration's recent approach to school reform.

McLaren: And this link is reinforced by profitability coinciding with the educational system, transforming it into a billion-dollar marketplace ripe for corporate investment and profit. An education which is subordinate to transnational capital can only be detrimental to any attempts to bring about social justice through education (McMurtry, 1998). I want to be clear here, Angie, that as a Marxist I am not advocating social justice in the sense of equalizing resources under capitalism. I am not trying to make capitalism more 'compassionate'—although that would certainly be a step in the right direction. I am for the abolition of capitalism both in its private property form and its state property form. In other words, I support the transformation towards a socialist alternative. A democratic socialist alternative, I might add, and what Marx referred to as the new humanism. I have labeled my position, revolutionary materialist pedagogy, multiculturalism, etc. Let us step back for a moment to sketch out how this relationship between education and capitalism has developed because how this relationship developed (and continues to develop) is just as important as its outcomes.

In many respects the deregulation of markets and the marriage between knowledge production and profit making has taken on the form of a transcultural prejudice, underwritten by capitalism's law of value, and what appears to be the unstoppable march of capital accumulation. Never in the history of human wealth-creation have fortunes been amassed so quickly by so many. The U.S. now has 300 billionaires and approximately 5 million millionaires. Silicon Valley alone adds about 64 new millionaires every day, according to recent reports. Nine million Americans have household incomes above $100,000 a year, up from just 2 million in 1982, [with] many of the new millionaires profiting from the science/technology industries (i.e., Bill Gates or Hendrik Verfaille [CEO of Monsanto]). It has been said that if Great Britain was the first country to produce a mass middle class, the U.S. is the first country to produce a massively large ruling class.[2] But let's not forget that the majority in the U.S. are not rich or middle class—but are working class. The working class, in the broadest sense, [are] those who have to sell their labor-powers to survive, those people who can't just live on assets. In a more pointed sense, the working class [is] those workers that produce surplus value for capital. There are three issues important to how our society makes a distinction between the working and professional class[es] besides the kind of labor which occup[ies] people. First, there is the issue of control over work (its content, pace, conditions, and so on)—the working class lacking in this area of social life. Second, there are the cultural aspects of class: dress codes, speech, mannerisms, and so on—more significant in countries like England perhaps than here in the U.S. but relevant nonetheless. Political power, of course, is the third issue and is particularly significant when analyzing the ruling class, as C. Wright Mills pointed out many years ago. As Michael Zweig (2000) and other commentators have noted, the political power of the economic elite is at least as great as it was in the 1920s, perhaps even more so, since today there are fewer challenges from other class interests. Contrary to the popular claims of the postmodernists, class struggle has not disappeared; it is simply being reconstituted. In fact, while class struggle from below may have temporarily disappeared from the discourses of many scholars, class struggle has strengthened

from above. Since the early 1980s, under the leadership of Reaganomics and Thatcherism, the ruling classes have waged an all-out class warfare from above against the working class. These continued struggles around class must remain central analytic themes in our work in urban centers.

Calabrese Barton: Democracy and capitalism in many ways seem opposed. And yet in the popular imagination they appear indissolubly linked.

McLaren: To argue that capitalism is fundamentally democratic is like saying Harry Potter is a Trotskyite or Leninist on the basis of his wearing round-rimmed glasses.

Calabrese Barton: Or a Lennonist!

McLaren: Right. Lenin—the Russian, not the Beatle—was correct when he wrote that bourgeois democracy, which was invaluable for educating the proletariat, was also narrow, hypocritical, spurious, and false and always remained a democracy of the rich and a swindle of the poor (Lenin, 1943). The structural inability of capital to provide for the majority of the world's population and its creation of historically structured systems of inequalities between men and woman, social classes, and developed and undeveloped countries mark the imperialist character of its current efforts to dominate the globe. What you are seeing today is the result of economic policies that date back nearly a decade. Capitalism's revanchist ascension to public education in recent years, under the guise of a neoliberal restructuring of the educational system through education–business partnerships, privatization, school choice, accountability schemes, and standardized tests, and the like, can be traced back to the early 1990s.

Calabrese Barton: At least to 1994.

McLaren: Exactly. My central claim is that you can't divorce educational policy from the transmogrification of the world economy because the global financial system is overrun by speculators and modern-day robber barons who are concerned with profit at any cost rather than social justice. Take the World Trade Organization [WTO], for example. In 1994 the World Trade Organization replaced the General Agreement of Tariffs and Trade [GATT]. This program established the framework and political architecture necessary for the U.S. to acquire free access to the global market. Consequently, the WTO, the World Bank, and the International Monetary Fund created a barrier between the poorest and most vulnerable of the world's population and big Western capital, mostly U.S. capital. Those in power in the U.S. hold onto the best jobs and export the most menial, low-wage, polluting industries.

In such a climate of outlaw capitalism and corporate orthodoxy, is it any wonder that education has been reduced to a subsector of the economy—a zone of free capital investment? Indeed, the corporate agenda for public and higher education fundamentally contradicts education in principle. Any value system that maximizes the private monetary interests of major stockholders without opposition or resistance is both anti-educational and complicit with superclass interests. Educators must keep the veneration of capital and the sacerdotal status of corporate rule out of education. We must provide students with opportunities to develop ''robust reflexivity'' (Harding, 1998). We must also engage in critical agency that moves beyond competitively selling knowledge as priced commodities for profit and private returns. Take, for example, the more than 1,000 corporate scientists in Monsanto headquarters building genetically engineered food systems—[this is] more about turning a profit then about real food safety. I am not suggesting that genetically altered food is unsafe—indeed, I do not think we actually know the longer-term impacts of adding new genes and proteins to plants, to our bodies, or [to] the larger global ecosystem. What I am suggesting is that we find ways to critically examine the relationship between corporate power and the knowledge we label for our students as ''objective'' and ''true.''

The rude contradiction in all of this is that where for-profit enterprises have been introduced in education, there is little evidence that students actually perform better or that high school graduates are getting better jobs (Zweig, 2000). What do you think of the fact that the leading private education company, Edison Schools, Inc., is consistently losing money? When private firms successfully compete with the government, it is usually because they take only the most potentially profitable segments of the market. In addition, private schools often screen out students who often need more attention (i.e., cost more money). In the final analysis private schools are a ''niche item'' that allows some students to do better (Zweig, 2000). Thus, once we realize that capitalism's link to democracy is really a chimera, we can begin to examine how urban science educational policy and practice is largely controlled by superclass political dominance (Perrucci & Wysong, 1999).

The Relationship Between Capitalism and Science

Calabrese Barton: Are you saying that science and education serve primarily the superclass? In other words, the oppressors, to use Paulo Freire's term?

McLaren: Yes, and your question brings me to my second major point: the relationship between capitalism and science has led to ''corporate science.'' More and more these days capitalism and science are moving into a shared orbit, as the earlier Monsanto example shows. If we conceptually undress the role science plays in the larger society, we can see how it stabilizes dominant social relations. If we make problematic the commonplace notion that science equals progress, we can begin to develop a different view of how science works. When I talk about science serving the interests of the dominant class, I am not only talking about paradigmatic historical exemplifications of scientists participating with, say, fanatical regimes of power, such as the Nazi scientists who helped to advance the ''final solution'' or members of the medical profession who have proved indispensable to military juntas for their work in perfecting ''interrogation techniques'' to be used during ''information-gathering sessions'' with dissidents and political prisoners. I am also talking about the ways in which corporate life and profitability shape and influence the directions and products of science.

Calabrese Barton: This all sounds very abstract.

McLaren: But the consequences are not. As underscored by Canadian philosopher John McMurtry (1998), the fact that corporate-directed science and medicine devotes little or no research funds to resurgent malaria, dengue fever, or river blindness (whose many millions of victims lack market demand to pay for cures), while it invests billions of dollars into researching and marketing dubious and often lethal drugs to treat nondiseases of consumers in rich markets, reveals a principle of selection of problems that is highly suspect. How else do you make sense of the millions dying in Africa from treatable diseases, such as tuberculosis, malaria, and sleeping sickness or the fact that the country that spends the most on AIDS research—the U.S.—is ignoring the plight of Africans who account for 70% of new AIDS cases worldwide. The reason that U.S. scientists are searching for a vaccine for a subtype of AIDS present in the north[ern] hemisphere is that drug companies don't find it profitable to sell drugs to dirt-poor Africa.

As David Trend (2001) has recently noted, university research has been transformed into a privately sponsored affair driven mainly by industries in bioscience and information technology. Projects that can produce new drugs, genetically engineered cotton, and faster microprocessing chips are reaping huge profits. In the pharmaceutical industry large research projects are no longer dedicated to saving lives of millions of people in the developing world but to creating lifestyle drugs for impotence, obesity, baldness, and wrinkles. Trend mentions that new resistant strains of malaria, tuberculosis, and respiratory infections killed 6.1 million people last year.

Yet of the 1,223 new medications introduced last year, only 1% was developed for those specific illnesses. Viagra sales totaled more than $1 billion its first year alone. But total global expenditures for malaria treatment stand at $84 million.

Calabrese Barton: And you could also have mentioned the biotech revolution—such as the recent case in South Africa where the drug companies backed down on suing the country for attempting to import cheap drugs to deal with their AIDS epidemic.

McLaren: Absolutely. Think about the vast amounts of capital poured into genetic engineering research, the genetic manipulation of corn and soybeans, not to mention the ''modification'' of animal reproduction or the human genome project. The point I am trying to make is that advances in science and technology are firmly lashed to the mast of capital's value form. Indeed, scientific value has been engineered, not for the improvement of the quality of life for all but for profit. Can you imagine sometime in the near future, the CEO of a biogenetic corporation calling his or her corporate quislings into the office and announcing: ''We need to recall several life-forms that may be flawed.'' This scenario is unlikely, especially when products are so intimately connected to the next quarter earnings. Perhaps I appear squalidly pessimistic here, but the stakes are too high. Let me be clear, Angie. I don't want to collapse innovations in technology with social and political institutions. As Callinicos (1999) points out, technology can be improved without changing its nature, but the same cannot be said about capitalism. To improve capitalism would require a fundamental change of its nature since it has as a constituent feature an inherent tendency towards crises. The major problem today is the widely held belief that there is no alternative to capitalism.

Corporate Urban Science Education

Calabrese Barton: So, it seems then that the corporate approach to urban science education might not be so different from the corporate approach to science. Let me be more specific. The challenges in urban science education are layered, and these layers are deeply connected to each other and to issues of power and control. I am concerned that science education has not incorporated the needs or concerns of children in poverty and children from ethnic, racial, and linguistic minority backgrounds. These ''gaps'' can be seen in high-stakes tests, mandated curricula, and daily school practices. I am also concerned that science—as a culture and practice—has developed along elitist lines resulting in a knowledge base and a cultural practice reflective of those already in power and uses the unobtainable ideals of truth and objectivity to hide its singular focus. Finally, I am concerned that schooling itself and the workaday practices of low-level worksheets, discipline through humiliation, and teacher–student bargaining (to name only a few) in urban centers strips children of their cultural identities, their right to learn, and their dignity as human beings. In short, I see schooling practices and the practice and content of science as potentially oppressive and schools and science as contributors to the colonization of people's minds (whether that be students, teachers, or anyone else). Are you arguing that the neoconservative agenda of implementing standards, assessing students' technical knowledge and understandings, and engaging in cross-national comparisons of student achievement ignores the ways in which the practice of schooling and the organization and intent of school science are structured to support capitalist goals? Isn't this what the ''weeder'' introductory college science courses are supposed to accomplish anyway?

McLaren: Yes, and this brings me to my third major point: that the marriages between capitalism and education and capitalism and science [have] created a foundation for science education that emphasizes profitability and control at the expense of social justice and human dignity. As long as society uncritically accepts the relationship between capitalism, science, and

education, then science educators will continue to be bound to discourses and social practices responsible for needless human suffering. Instead, science education needs to be directed to assisting an educated population with managing a large-scale investment program for a sustainable future for humanity. The wealth of our nation should be measured by the elimination of class exploitation, racism, sexism, homophobia, and other forms of oppression; by the health of a people, their creative capacities, their standard of living, and their well-being. I feel strongly that a corporate approach to science in our classrooms has failed to raise questions dealing with what knowledge counts most, for whom, and for what purposes. I also feel that it has distanced science from confronting the objectifying and mediating functions of capitalist production and exchange relations, deflected attention away from how the advanced imperialist order of contemporary capitalism actually works in the production of knowledge, swept away contradictory class interests, and cultivated an engineered misunderstanding of how the geography of capital accumulation helps perpetuate bourgeois power and suppress workers' rights and aspirations.

Calabrese Barton: I can link your point about distancing science from class interests to, on the one hand, how we ''teach'' about developing countries in science class. The rare moments when developing countries are described in typical science textbooks tend to be in relation to disease and pollution (i.e., the typical biology textbook picture of the poor African woman with a goiter). The sad parallel is that, on the other hand, I can link this very example to how little mention (or no mention) is given in these same texts to how these poorer countries often serve as the first clinical test beds for new drugs. Let us not forget what is also happening in our poor centers in the U.S.—Hispanic and African American children were immunized with the EZ measles vaccine in Los Angeles, and their parents were not informed that the vaccine was not licensed in the United States (Trafford, 1996). How would you say these ideas translate pedagogically?

McLaren: The issue for me is to create pedagogical sites where educators and students collectively can ''speak truth to power.'' One of my goals is to develop learning contexts—both in schools and in community settings—where the local habitation of such a struggle for socialism can take root. For me, the educational system is an important possibility in this regard. It is here that critical pedagogy can be employed in the teaching of science. At present there is a haunting absence of critical approaches to the teaching of urban science, an enigmatic silence with respect to attempts at conscripting teaching science into the service of social justice. Here, Angie, I need to emphasize what I mean by social justice. I mean, who would ever admit that they are against social justice? I am not referring here to a liberal bourgeois notion of social justice, of dividing up the spoils of surplus value more equitably. Because this agenda is still premised on the logic, the practice, and the rule of capital. The very creation of surplus-value turns human beings into human capital—in short, it ''capitalizes'' them, as my friend Glenn Rikowski would say. I am against capital's law of value altogether. Social justice for me can only be achieved through the abolition of capitalism, and through the forging of new human relations through a socialist alternative by means of a Marxist-Humanism.

Calabrese Barton: Can you expand a bit on what you mean by critical pedagogy and why this approach may help to foster social justice and ''science for all'' in urban settings?

McLaren: I believe that a critical pedagogy of urban science approached from a Marxist perspective[3] evaluates educational policy and practice using the following criteria as a yardstick: Does it mobilize the working class to engage in activities that address those contemporary dynamics of advanced capitalism that place education in a subordinated partnership with imperialist capital? Does it promote unity of political purpose within a diversity of experiences (race, gender, class, and sexuality)? Does it promote gender equality and the destabilization of

patriarchal structures of oppression? Does it promote racial/ethnic equality and dismantle the hegemony of White privilege? Does it improve the overall lives of the working class? Does it provide leadership in challenging the injustices that are constitutive of capitalist accumulation? Does it provide opportunities for an analysis of the contradictions between the forces and the relations of production?

Calabrese Barton: So how do you see critical or, rather, revolutionary pedagogy intersecting with the production of scientific knowledge in classrooms? And, how might we think about this intersection in our work with urban youth? In other words, you have outlined a stance towards science and a stance towards education, both of which emerge from a critique of the democracy–capitalism couplet. My concern now is: so what does it mean to bring these ideas together in our efforts to build a more socially just science education in urban settings, especially in the daily practice of classroom life?

McLaren: Although it is hard to speak about the practicalities of classroom life because students and teachers are situated differently from day to day and from place to place, I will share some general thoughts on the kinds of classroom practices in urban settings that may underpin these more abstract ideas. It seems important that the practice of teaching has to be constructed differently. Urban teachers are confronted, on the one hand, with ''being accountable'' to district and state standards, with the expectation that they are there merely to transmit the epistemologies and cultural practices foundational to these standards. On the other hand, urban teachers interact daily with diverse groups of students who may, as cultural groups, be semiotically and physically excluded from the very assumptions which drive those standards at the same time that they are confronted with limited resources, time, or decision-making authority to do anything serious or systematic about what or whom they need to be accountable to or serve. To think about teaching differently means that we must think about what it might look like in classrooms to reject this structured and regimented practice and begin to question what or how it is that teachers are supposed to teach. We must also begin to question how the very structure of schooling also works to silence any kind of critical conversation about what or how teachers are supposed to teach. In other words, teaching becomes about not only critically assessing the science and how it may intersect with the lives of students who are most often on the fringes of science but also critically assessing why it is that conversations about power and authority—at both local and global levels—are generally not allowed in science class.

Take, for example, the case of Beta, a Grade 8 teacher in a major urban center. As part of a unit intended to teach her students about temperature gradients and the function of insulators, she had her students design the ''ideal cooler,'' big enough to fit a six-pack of soda. She had prepared a set of experiments to test out different materials for their ability to insulate. She also prepared different activities to help the students think about size, scale, measurement, and design. Although her students would have to work in groups because she did not have access to a wide swath of resources, she believed that this experience might at least get them thinking about science outside the text. Her implementation of the unit was not as she anticipated. Her students verbally and physically indicated their disinterest in the project. Yet Beta took their resistance and turned it into a class-long discussion about ''what the class should do with the topic of insulators,'' given that she was bound by certain district learning standards and limited resources. She learned that her students preferred to design insulated lunch bags that held their lunches rather than a six-pack cooler, and they preferred to make individual bags because they wanted to keep them and use them. She also learned that the aesthetic quality of the materials was also important as the students intended to actually use these bags for their lunches. Through the story of one student's experiences with their family's icebox in the Dominican Republic [DR], she also

learned that they had ideas, more complicated real-world simulated experiments to test out the viability of the lunch-bag design. Students' concerns about inequalities, both local and global, also emerged: differences in the availability of insulating and cooling devises in different places, such as refrigeration in the U.S. versus the poorer communities of the DR, or the differences in air-conditioning systems between the affluent and poor school districts in the city entered the conversation. Finally, the students voiced their belief it was more important for the school to spend money on better and more materials than the kinds of things the school typically purchased (paper for too many worksheets, overhead projectors, and metal detectors).

This seems like a simple story, but indeed it raises questions about what it means to think about teaching and science differently. By allowing her students to see ''inside'' the expectations that schools place on teachers—by turning the classroom talk about why build lunch bags over coolers into talk about the science standards for the quarter—Beta's students turned science class into political space, where the learning of science was coupled with learning about (and critiquing) the schooling process and the purposes and goals of doing science and its connections to social control, economic trade-offs, and human welfare. Beta and her students not only created new spaces to design and build lunch bags—something that was important to them in their day-to-day lives but also critiqued the purposes behind why making lunch bags was a necessary and important project for them to engage in as students. It made public the profound differences between learning a regulated list of science standards for the purposes of fitting into a particular mold of scientific literacy and engaging in a practice of science for the purposes of youth development.

This story also helps us to begin to reflect upon what it means to interrogate how science education is framed through profitability and control at the expense of social justice and human dignity. The youth recentered the goals of science class as about agency and learning to use and produce science in situationally meaningful ways rather than as about good studenting and capitulating to the contemporary dynamics of advanced capitalism that place education in a subordinated partnership with imperialist capital (i.e., where learning to be an obedient student is more important than learning to be critical of how power, knowledge, and culture interact to facilitate particular definitions of science and schooling). Here the difference is more powerful yet more subtle: The youth enacted a critique of ''do we do science in ways and times set out by others in order to keep systems moving smoothly or do we do science in ways that turns those systems on their heads—in ways that uncover just how much the process of learning science is embedded with issues of hegemonic control, as can be the very construction of science itself.'' Yet even more could have happened and may still happen in Beta's class—the youth could see their actions as students building lunch bags and as students critiquing their school and science as part of a larger global effort to better understand how structures like school and science help to perpetuate global inequalities and social injustices.

This example also shows the ways in which transforming what it means to teach positions students and science with and among each other differently. It makes asking questions about why some ideas are taught at the expense of others or how it is that some scientific practices elevate certain cultural beliefs and practices over others a part of the discursive practices of the science classroom. Indeed, it creates the kinds of spaces that allow students and teachers to interrupt the practice of learning and doing science in order to uncover the unacknowledged aspects of culture that historically underwrite and shape the social practices out of which science education is produced through experiences like end-of-year exams, textbooks, or state and local curriculum objectives. Think about it. This story could have turned out many ways. Beta could have made her students make the coolers. She could have listened to her students and allowed

them to make the lunch bags with out exploring the deeper intentions in such a decision. Rather, she chose to politicize the students' choices as a vehicle for helping her students (and herself) to uncover the assumptions that guide the practice of schooling in urban centers.

Calabrese Barton: Your point that position matters in the science we teach, and how we choose to teach it centralizes both the importance of how we think about the purposes and goals of science education as well as the roles that students and teachers play in that process.

McLaren: Yes, and indeed, one of the keys for me is vantage point (Althusser, 1975) and how this ideal in light of revolutionary pedagogy shapes classroom practices. For Foucault (1972, 1973), local knowledges must be reactivated against the scientific hierarchy of knowledges. Harding (1991, 1998) has made some important advances in this regard in her development and refinement of ''standpoint epistemologies.'' For Harding standpoint epistemology sets the relationship between knowledge and politics at the center of its account. It explains the effects that different kinds of political arrangements have on the production of knowledge and knowledge systems. Empiricism tries to ''purify'' science. Yet Harding has shown that these empirical methods never reach greater objectivity, for they exclude thought from the lives of the marginalized. For Harding, who draws upon postcolonial, feminist, and post-Kuhnian social studies of science and technology as well as Latour's notion of technoscience, with its tension between local and global science practices—all attempts to produce knowledge of any kind are socially situated, and some of these objective social locations are better than others as starting points of research. Harding points out that, for instance, when physics is permitted to set the standards for what counts as nature and what counts as science, knowledge becomes truncated and is often misapplied, limiting our ability to produce knowledge in ways that can assist aggrieved populations.

So the question arises: What are the knowledge opportunities for the marginalized and disenfranchised, especially for those youth who live and go to school in poor urban settings? To use Harding's terminology, these groups occupy the ''borderlands'' as ''outsiders within.'' The dominant conceptual frameworks, criteriologies, systems of intelligibility and classification don't reflect their input or their interests. When decisions are made as to what kind of scientific studies should be undertaken, these groups rarely have a voice. Similarly, when decisions are made as to what kinds of science should be taught in school, these groups again rarely have a voice. Indeed, the example of Beta involving her students in her decision-making process was not the norm, and if Beta continued this practice throughout the school year, may even have found herself in trouble with her administration. The dominant epistemologies and truth claims exercised by the bourgeois science establishment dehistoricize knowledge conflicts within science and fetishize them as permanent and unavoidable features of the scientific enterprise instead of seeing them as conflicts produced by class struggle, by patriarchal oppression, by heteronormative and homophobic perspectives. But doing science, both in the scientific workplace and at schools, from the perspective of the oppressed—whose lives bear a disproportionate share of the costs of these activities—can bring a wealth of important knowledge to the table. In Beta's case it wasn't that making the lunch bags that was so important—rather it was that the youth questioned the process of how decisions to make a cooler or a lunch bag get made, why they get made, and the implications this has for what students learn and do in school. This questioning pulled into the public discourse their lives, the intentions of the school system (i.e., the standards), the issues faced by urban schools (the lack of resources, the distance between the prescribed curriculum and the students' lives, and the overwhelming focus, at least in her district, on passing the test), and the larger connections between science, schooling and the perpetuation of inequalities—why the difference between availability of cooling and insulation systems in affluent versus poor communities?

In urban science education circles—both in schools and in universities—we must begin to ask hard questions about what and how we teach and research: How is science integrated with and across diverse communities such that scientific advantage accrues to some but not to others? How do we interrupt this process? What are the unacknowledged aspects of culture that historically underwrite and shape the social practices out of which science is produced or about which science education is produced through experiences like end-of-year exams, textbooks, or state and local curriculum objectives? How are women, racial/ethnic minorities, and the working class functionally excluded from the dominant practices of doing science? Of course, for me the struggle is not only about a more just and equitable distribution of resources but transforming existing contradictory capital–labor relations in such a way that the system itself does not generate such contradictions.

Calabrese Barton: Yet some have described standpoint epistemology as relativist, and, indeed, some have argued that this only further oppresses youth in marginalized settings because it denies them opportunities to ''learn the canon'' or to ''have access to the culture of power.'' After all, with the push towards greater accountability, how much will it matter to students if they learn to see the intersections between science and culture yet fail to learn the Western canon of science?

McLaren: ''Learning the canon'' and learning/critiquing/revisioning how culture and science intersect are not mutually exclusive. Indeed, finding ways to access the canon is a central part of critique and revision. It is that the focus is different. Harding points out that this kind of diametric thinking confounds power with cultural differences. Differences are historical and material. They also stem from a confusion that empiricism is politics-free, that the canon is apolitical, ahistorical, and acultural. Standpoint epistemology is more sophisticated than this in that it constitutes a powerful sociohistorical analysis of how dominant discourses of science work to serve the interests of the powerful by masking their claims in a neutral view-from-nowhere position. What I like about the way Harding uses standpoint epistemology is that she doesn't assume that because a standpoint is articulated from the position of the oppressed that it is necessarily the best position. Freire (1978) used the term *basism* to describe this. In other words, consciousness is not determined by social location but it is greatly influenced by it. Just because somebody is oppressed does not mean their statements or opinions are exempt from critical scrutiny. But the political underplot of Freire's work (1978, 1993) opens up the process of becoming literate to the idea that the oppressed are in a unique position to reclaim authority for their experiences in the struggle to end exploitation on the basis of race, class, and gender. My position is not to reduce science education solely to politics. Rather, I want to assert that position *does* matter, both in terms of the science we teach and in the ways we choose to engage students in a critical understanding of that science. Adam Katz (2000) articulates the relationship between science and politics that I am trying to underscore here:

> If the service science provides to politics is in explaining its conditions of possibility, eliminating as many false paths as possible, and demystifying obscurantist ideological generalities, this is, first of all, in the interest of a science that itself depends upon a politics that defends its conditions of possibility by opening spaces previously closed to scrutiny; furthermore, this displays before science the limits and terms of its own tasks, and it sets science in motion by opening itself for critique. Politics, likewise, is interested in a science that protects the foundational political categories upon which politics and science both depend—categories, in the case of Marxism in particular, whose demystification stands at the origins of the science itself and whose various appearances, semblances, and mystifications set the terms for science or revolutionary theory. (2000, pp. 24-35)

My struggle to promote socially just education, especially for children and youth in poor urban settings, stems from a critical analysis of my own experiences as an elementary school teacher. Indeed, I know the very ideas I present here are difficult to live in the big machine of schooling. Yet if we do not try, we will have given over ourselves as educators to a future filled with inequality, oppression, and unlived lives. I believe deeply that we must commit in urban science education circles to work with and for youth to make the science they learn and they science they do a part of the practice of working towards social justice in our urban centers here in the U.S. and especially in developing countries. No other goal will bring us closer to science for all.

Notes

[1]I need to add this qualification: I don't agree with some of the Frankfurt School theorists who reduce the physical sciences to instrumental rationality. In other words, I don't believe that the sciences are only forms of domination, bourgeois impulses seeking to master the laws of nature and the physical environment. The epistemological critics of science—Lakatos, Bachelard, Popper, Canguilhem—postulate a relative autonomy of theoretical science through the idea that sciences serve as a type of heuristic (Callinicos, 1999). What interests me is how scientific knowledge is integrated into private corporate power.

[2]These figures are the May 20, 2000, article ''The Country-Club Vote'' in *The Economist,* page 42.

[3]In looking at critical pedagogy, it is important to demarcate its staging ground and political trajectory (McLaren & Baltodano, 2000). It is primarily a dialectical approach to understanding the contradictions within social life grounded in a commitment for encouraging each group—defined in racial, ethnic, gender, or other ways—to claim a notion of the good. My particular approach to critical pedagogy is Marxist, and I have often chosen to refer to it as ''revolutionary'' pedagogy. The critical pedagogy that I am seeking bears a kinship to the Marxist humanism developed by Raya Dunayevskaya and, more recently, by Peter Hudis (see Dunayevskaya, in press). It emphasizes the way in which Marx's work was deeply immersed in the dialectics of the revolution. It is grounded in Marx's notion that capital is a form of congealed abstract labor and that the transcendence of alienation proceeds through a ''second negativity'' (Hudis, 1997; Marx, 1975). The first negation would be the negation of private property—that is, to get rid not only of the capitalists but capital itself. The negation of the negation—that is, the negation of the negation of private property and the political overthrow of the bourgeoisie—must occur if capital is truly to be abolished (Dunayevskaya, 1989). This notion of self-movement through absolute negativity is what Marx meant as the basis of permanent revolution (Hudis, 1997).

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[1]Hudis, P. (2000b). Can capital be controlled? The Hobgoblin, 2, 7–9.

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