Chapter 8
Constructing New Knowledge in Industrial Archaeology

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8.1 Introduction

Industrial archaeology (IA) is the study of the physical remains – the artifacts, systems, sites, and landscapes – of industrial society, including their cultural, ecological, and historical contexts. Practitioners of IA not only study these remains, but are also often involved in their practical preservation, management, and/or interpretation.[1] Over the last 50 or 60 years, IA has matured from its early beginnings in the United Kingdom into a worldwide interdisciplinary community of people drawn together by collective desire to understand the industrial world.[2]

[1] Seely and Martin (2006) have written a short history of the IA program at Michigan Tech that included the philosophical justification for our design of the Industrial Heritage and Archaeology Ph.D. Analysis and discussion of the Michigan Tech's M.S. degree, including comparisons to other programs in heritage or industrial history, were published by Crandall et al. (2003), Weisberger (2003), and Martin (1998, 2001).

[2] Industrial Archaeology began in England as a combination of scholarship and activism aimed at preserving or recording the earliest remains of the industrial revolution, and spread through the United Kingdom (Buchanan 2000; Palmer 2010; Palmer and Neaverson 1998:8–15) then quickly through the United States, Western Europe, Canada, Australia, and Japan. IA developed differently in various countries, but has generally been inclusive of avocational involvement through local societies and organizations. Martin (2009) recently overviewed the development and internationalization of IA, connecting it to many of the themes in this chapter, and situated the West Point Foundry project among them. Many IA practitioners have also published for audiences of enthusiasts along with their colleagues. Whenever and wherever IA found an academic home, it was often in adult education programs in a particular national college and university system (Martin 2009:286) or at newly formed open-air or eco-museums (Storm 2008:29–46). These trends led to periodic debates over how IA is to be defined, for example, whether it should be more or less tied with resource management and the heritage industry (Alfrey and Putnam 1992; Palmer 2000). Martin's (2009:286–289) overview included a review of IA's development in the United States and further

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H. Mytum (ed.), *Global Perspectives on Archaeological Field Schools: Constructions of Knowledge and Experience*, DOI 10.1007/978-1-4614-0433-0_8,

We have been collaboratively teaching IA field schools at Michigan Technological University for 10 years. Tim Scarlett joined the Michigan Tech faculty in 2001, and for 10 years before that, he had taught field archaeology at industrial sites. Sam Sweitz began teaching in the IA program in 2005, and also has a similarly long interest in industrial heritage. We are both anthropologists trained in the American style of a four-field approach, which ties archaeology and ethnography with linguistic and biological anthropology. We are also Americanist scholars in that our research has concerned the industrial history and cultures of North and Central America, and the Caribbean.

Michigan Tech's Department of Social Sciences has offered an annual field school in IA for more than three decades. We offer the field school in conjunction with our graduate degree programs[3] and the majority of our field school students during the last 10 years have been enrolled at Tech pursuing degrees in either Industrial Archaeology (M.S.) or Industrial Heritage and Archaeology (Ph.D.). The graduate programs in the Department of Social Sciences are unique in North America, and given the interdisciplinary design of our program, our students undertake courses of study unlike any others in the world. Our program blends scholars

overviews or case studies can be consulted for Sweden and Scandinavia (Nisser 1983), Europe (Palmer and Neaverson 1998:8–15), Australia (Casella 2006), Japan (Komatsu 1980), as well the spread into Mexico and Latin America in the 1980s and 1990s (Oviedo 2005, and the rest of *Patrimoine de l'industrie/Industrial Patrimony* 13, Part I: 7–66) and Spain (Cerdà 2008). Published field guides and inventories of industrial heritage are very numerous. These national and regional movements were united in the first International Congress for the Conservation of Industrial Monuments in Ironbridge, England, in 1973. In 1983, delegates from many nations meeting at the third international congress established The International Committee for the Conservation of the Industrial Heritage (TICCIH). There remains a strong distinction between the Anglophone traditions of industrial archaeology in England, the United States, and Australia, and the contrasting idea of *Industriekultur* in continental countries like Germany (Ebert and Bednorz 1996) and Sweden (Storm 2008), as well as the traditions of Iberioamérica (Areces and Tartarini 2008). The nascent involvement in TICCIH by representatives from India and China (Dong 2008; Joshi 2008) will add more distinctive voices to the community. Industrial Heritage is flourishing around the world, a fact made clear by the many excellent publications like the journals *Industrial Archaeology Review*, *IA: The Journal of Industrial Archaeology*, *Patrimoine de l'industrie/Industrial Patrimony*; bulletins of professional and avocational societies, such as the *TICCIH Bulletin*, and the creation of numerous industrial museums, monuments, landscapes, festivals, and heritage areas now busily being organized into ever larger networks of industrial heritage like the European Route of Industrial Heritage (http://www.erih.net).

[3] Michigan Tech began accepting graduate students to study for a Master's of Science degree in Industrial Archaeology (M.S.) beginning in 1991 as well as a Doctor of Philosophy in Industrial Heritage and Archaeology (Ph.D.) in 2005. While the Department of Social Sciences has always had a small number of undergraduate students studying for degrees in history, social sciences, or the teaching credential associated with those degrees, the department only recently created an undergraduate major in Anthropology in 2009. The addition of this degree seems to have also caused an increase in the number of undergraduate field school enrollees, but more time is needed to know if the intellectual balance of our field schools will change. Information on all the graduate degree programs as well as details on planned field schools can be found at http://www.industrialarchaeology.net.

Fig. 8.1 Industrial archaeologists must be able to collaborate with members of descent communities. Graduate student Carmelo Dávila interviewed José Ramón Rivera about the community and his work as a sugar mill employee in Aguirre, Puerto Rico, in 2007 (photo by Sam Sweitz)

and perspectives from IA, historical archaeology, history of technology, ethnography and social history of industrial communities, material culture and architectural history, heritage management and documentation, all of which are unified through a heavy focus on field training with the material remains of industry (Fig. 8.1).

We expect that all the graduate students in our program should learn more than theoretical justifications for IA, but also master basic IA fieldwork skills, including recording historic structures and conducting archaeological excavation. Our students must combine the skills of documentary photography and measured-drawings[4] with common techniques of archaeological excavation and the scientific tools that have come to be expected of modern field archaeologists: digital total station survey, Global Position Systems, Geographic Information Systems, AutoCAD, and experience with some type of remote sensing or imaging technology.

[4] We teach photography and drawing as part of our regular curriculum using the Secretary of the Interior's Standards and Guidelines for Architectural and Engineering Documentation. In the United States, National Park Service's Heritage Documentation Program administers the Historic American Engineering Record, Historic American Building Survey, and Historic American Landscape Survey (collectively known by the acronym HABS/HAER/HALS). These policies are available at: http://www.nps.gov/history/hdp/standards/index.htm.

At Michigan Tech, we introduce our students to IA as a global field. Practitioners in this global IA community have widely varied relationships to the definitions of archaeology created through academic or government bureaucracies, as one would expect. As the junior scholars at our institution, we are pushing IA to grow beyond the traditional "core" of the field, exploring alternative regions, industries, forms of production, and perspectives. Yet we do this while preserving the traditional strengths of the field, with its focus upon the evolving technologies and social networks of production.

Hardesty (2000) wrote of the "voices" of IA. In his essay, he discussed the overlapping and distinct communities that participate in fieldwork. Our thoughts on the experiences of IA field schools undoubtedly reflect our backgrounds as anthropologists (and one of us studied under Don), but we think that our experiences meaningfully connect to larger issues and concerns within many academic training programs. Building on the idea of voices, we introduce each section of this essay with a quotation. These words were spoken by our students, our colleagues, or one of us during a field school or class activity. Occasionally, we have been forced to paraphrase or soften a student's word choice, but have retained the spirit of their thoughts.

8.2 Wait, Hold On: You Get to Do Mechanical Drafting *and* Archaeology?

This fall term, one of us ran into a young woman in our campus library coffee shop. She had enjoyed Tim's general education lecture course for first year students and had stopped him to ask what he was teaching this term. He told her that he had just started teaching our department's IA course and that over the weekend, the class had hiked out into the mountains to measure and draw some midnineteenth century stamp mill machinery that still lay *in situ* at a mine site here in Michigan's Upper Peninsula.

In her excitement, Tatiana had interrupted Tim midsentence to ask her question about the intersection of mechanical drafting, engineering, and archaeology. The incredulous look on her face gave way to a look of envy as Tim explained the methods and goals of IA, painting her a broad picture of the field. She was studying mechanical engineering at Michigan Tech and had never considered that archaeologists would study things like constructed mechanical systems in industrial process or workplaces. Her reaction raised many questions for us.

Over the years, precious few or no undergraduate engineering students enrolled in our field schools. This is odd, considering the appeal of IA to students of engineering and the importance Michigan Tech places on mechanical and industrial engineering; metallurgy; materials; engineering technologies; and environmental, civil, geological, and mining engineering and sciences. This is undoubtedly a result of the lock-step curriculum assigned for prospective engineers. Undergraduate engineering students at MTU are pressured to get summer job placements, co-ops, and internships that keep them on their tightly defined career track (see also Chap. 6).

If they are not in a co-op, students often spend summers redoing courses from which they withdrew during the year, trying to "catch up" with their cohort. Certainly, many undergraduate engineering students must also work summer jobs to earn money to pay for their studies the following year, and like a co-op or internship, this means they cannot go "into the field" for 6, 8, or 14 weeks away from campus.

So who are our field school students? From what groups do we draw people into our learning community? Like most archaeology research teams, Michigan Tech's are composed of people from many different backgrounds. While we hesitate to label individuals with demographic categories or to ascribe identities to them, over the years we have noticed that our field schools attract students and volunteers from varied life-stages. Our undergraduate student community at Michigan Tech is largely non-Hispanic White (81 ± 4%) and male (76%), reflecting general social patterns in STEM education within the United States (Scarlett 2007). As we mentioned above, however, Michigan Tech undergraduate students are usually in the minority on our research teams during field school. We also rarely see traditional undergraduate students from other universities, although those that do enroll are almost always studying history, anthropology, or archaeology, and rarely engineering.

The clear majority of field school enrollees stumble upon Michigan Tech and IA as a consequence of web searches. Others learn by "word-of-mouth" while traveling to see the artifacts, spaces, landscapes, or sites of industrial history. Very few enrollees find us using online databases like the *Archaeological Fieldwork Opportunities Bulletin*. Most of our field school enrollees are considering graduate studies in IA. About one half of our field school participants, however, are nontraditional students and they have usually worked for ten or more years before attending our field school. These practicing archaeologists, museum interpreters, photographers, artisans and craftspeople, engineers, and designers are so thrilled by their discovery of IA that they are often moved to apply to our graduate program. By joining the research team at field school, these students actually complete the first credits towards their graduate degree.

8.3 Foamers Are to Enthusiasts as Speed Freaks Are to Coffee Drinkers

At least one field school participant is often retired from a lifelong career, often in industry, technology, or engineering. These individuals choose to pursue their passion, studying industrial heritage. In 2009, Tim collaborated on a public archaeology project in Utah. One research team member used this simile to express the powerful passion that avocational researchers feel for the "big stuff" of industrial heritage. As archaeology has its fans that knap stone tools or replicate pottery, and history has its battlefield reenactors and buckskinners, so IA has individuals passionate about steam engines, locomotives and trains, foundries and furnaces, lathes, generators, grease monkeys, and machinery. In IA, many of these people often self-identify as "foamers," a nickname originally meant to be snide and pejorative,

recalling a rabidly passionate enthusiast foaming at the mouth with excitement, standing in rapture before a running Corliss-type horizontal beam engine (with a 14″ diameter piston, 36″ stroke, and a 13-ft diameter flywheel, of course). Academics and professionals belittled this passion, criticizing the avocational individuals' lack of enthusiasm for advancing knowledge beyond antiquarian indexing, such as publishing comprehensive catalogs of machine types, locomotive engines, or surviving canal boats. Avocational IA communities have co-opted this nickname as a badge of pride, as is often the case with subcultures, and continue to thrive.

Our annual field school research teams often include at least one nontraditional student that might identify themselves as a foamer. Sometimes this person is a retired mining engineer, machinist, industrial manager, media specialist, or an agency land manager that discovered IA on the internet. Like the nontraditional students that enter our graduate program, these individuals join our research team because they are passionate about Industrial Heritage. These volunteers come to field projects through Elder Hostel, Earthwatch, or are simply interested in earning undergraduate credit. We find these people to be a tremendous asset to our learning environment during field school. They connect us to our intellectual history, since IA originally developed in alliance with adult continuing education programs in the United Kingdom (Cossons 2007: 12–16; Buchanan 2000, 2005) as well as the United States (Martin 2009: 286–289). In addition, IA has an advantage over general archaeology, as that field has systematically alienated most of its avocational communities. As we professionalized during the last century, and particularly during the past 40 years, scientific archaeology exerted a primary right to study antiquities using rigorous technical methodologies within defined ethical boundaries. As a consequence of that process, many professional and academic archaeologists took a moral high ground and drove others from the field, including museum curators, antiquarians, treasure hunters, looters, collectors, and all manner of hobbyists. Concurrent and parallel to that trend, archaeologists had long cultivated strained relationships with indigenous and aboriginal communities (Thomas 2000; Killion 2008; Ashmore et al. 2010). In the United States, this played out within the broader "culture wars" of the last 25 years.

While the archaeological heritage benefited from greater care and protection, and the discipline experienced great intellectual advances, archaeologists have recently spent a great deal of time struggling with the consequences of this alienation. Most particularly, professionals are trying to mend relations with aboriginal and descent communities. IA did not go through this. The avocational community still plays an important role in IA, attending annual national meetings of the Society for Industrial Archaeology and its local chapter events, taking factory and plant tours, interacting with students, and talking about their own passionate research. This is also true in the UK, and we would do well to remember that we industrial archaeologists didn't invent industrial tourism. America's elite traveled to see the early republic's industrial splendors along with its natural wonders (Gassan 2002), more than a century and a half before IA ever existed!

Foamers are also often stakeholders in industrial heritage. Many people with a passion for industrial history, architecture, or machines often work as engineers and

mechanics in industry today. Many are deeply shaken and saddened by the structural adjustments of the American economy, particularly following the major changes during the last 10 years. Most are advocates for preservation in their own communities, where they have watched deindustrialization undo their life's work.

8.4 You Mean You Didn't Have Metal Shop in Junior High?

We increasingly come to rely upon foamers and other avocational and nontraditional students as key members of our field school research teams because many of them have direct experience with industrial labor. Fewer and fewer American university students have any experience with artisanal work, training as mechnicians,[5] or factory work generally. Over the past 50 years, most schools have shifted their academic programs to prepare students for postsecondary education, leaving little room for vocational-type classes. This has been exacerbated by "No Child Left Behind" educational policies, where schools now structure students' learning environment around testable, assessment-driven learning outcomes. Many school systems no longer require college-bound students to take wood shop, metal shop, mechanical or architectural drafting, home economics, or other experiential learning-based courses.

Fewer and fewer middle class undergraduate students in American universities are prepared to understand industrial labor. While some grew up gardening for example, few have had an opportunity to forge-weld using hammer and anvil. When they work, most undergraduates in the United States take jobs in service or retail industries, a trend that reflects ongoing structural changes in the American economy. Foundry and factory work are therefore as alien to most students as plantation or farm work. Our nontraditional field school students, who have returned to college after working in a steel mill, fishery, auto plant, rail yard, or mine, have consistently stepped into the role of peer-mentor, helping the younger students develop understandings of industrial work and labor.

The chronic disconnect between contemporary students and industrial activity is in part a generational experience that is increasingly becoming a population-wide phenomenon in the United States, as industries continue to relocate outside our communities. This movement of course is both symptomatic and symbolic of the changing and evolving nature of a capitalist world economy that in the modern era has informed and continues to inform the working lives of countless individuals globally. It is this connection, between the past industry of IA landscapes and the continuing cycle of industrialization, that we feel brings a particular relevance to the study of industry and labor.

[5] A mechanician is a practitioner of applied mechanics. In the twentieth century, professional engineers used this term to refer to anyone working with engineering mechanics. In the eighteenth and nineteenth centuries, the term would apply to any person working with practical applications of mechanics, trying to use physical theory to derive useful solutions for specific technological devices or systems.

8.5 5,000 Bricks Per Person Per Day?

Unfortunately, most students do not fully realize that we still live in an industrial economy. The markets of capitalism mystify the commodity chains that provide consumer goods to most Americans leaving only a vague sense of the processes that connect producers and consumers across disparate geographic regions and cultural conditions. Making students aware of the links that connect people across this global system problematizes these connections, but it is the practical exercise of doing IA that actualizes and personalizes these bonds.

We were both able to start teaching field schools in IA while teaching a class for academically gifted young students. Johns Hopkins University's Center for Academically Talented Youth allowed Tim to spend 10 years teaching a university-level introduction to archaeological sciences, with Sam serving as a teaching assistant for one of those years. As a part of that 3-week course, the 12- to 16-year-old students spent 1 week in the field recording the landscape and features at the site of the Lancaster Brick Works (1919–1979). We used the former brickyard as an outdoor classroom for our experimental archaeology labs as well as our fieldwork, and the students spent a lot of time clearing brush and moving piles brick – sometimes lots and lots of brick. The physical labor made a significant contribution to the learning environment because it created a sensory link to the industrial landscape.

As part of this course, the teenagers were able to learn from former brick workers. They met the last company president and interviewed other workers in the community. They heard the stories about how the managers supplemented regular staff by hiring hobos off the railroad to work in the yard. These men would assemble or unpack the kilns, a process during which one individual tossed two or more bricks per throw, pulling from a cart or pallet and feeding another man that was placing them as the kiln took form. Each individual threw at least 5,000 bricks per day at the Lancaster Brick Works. The students heard how the hobos and regular workers drank alcohol to numb the pain of the work. They heard testimony that despite the hard labor that bloodied people's hands, homeless people riding the rail knew that the Lancaster Brick Works yard was a good place to earn some money. The hot kilns of "Tickville" made a good place to camp on a cold winter's night after a day of work, only a short hike from an urban area, but also largely beyond the gaze of urban society.

Over time, we have come to believe that this physical labor is a critical part of the holistic learning environment during a field school because it opens industrial history to individuals who relate to the world through emotional and bodily kinesthetic intelligences. For many students, for example, this physical labor connects them to their own industrial heritage in their families. At Michigan Tech, we have been lucky to collaborate with students struggling with physical disabilities, elderly persons, and others that wanted to excavate and haul rubble as a regular part of a research team. We have always found creative solutions to these challenges.

8.6 I Just Can't See the People!

In designing our field schools, we often collaborate with modern artisans and include tours of operating industrial facilities when possible. Casting molten aluminum into hand-packed sand molds at Newburgh's Super Square Foundry[6] helped students understand the industrial processes that people performed in excavation areas at the West Point Foundry. Owner Dean Andersen and journeyman Amy Lahey believe passionately in the power of experiential learning and they shared their knowledge of craftsmanship with our students every year, helping them to learn to "see" some of the skills that make foundry work possible. Dean and Amy were interviewed by journalist (and fireboat engineer) Jessica DuLong in 2003 and she summarized their perspectives on increasing invisibility of hand-labor (2009: 237–240). Gordon and Malone (1994: 38–42) argued that artisanal skills and knowledge systems that accompany activities like patternmaking and sand molding are one of three knowledge or skill sets essential to understanding industrial production: work and artisanal skills, engineering and scientific skills, and organizational and management skills (Fig. 8.2).

In the first few weeks of the field school, students occasionally repeat critiques they have heard from previous professors, claiming that they "just can't see" the people we are studying. The students who express this have stumbled into 30-year-old stereotypes about the field or they have read work that pressures archaeologists to adopt a single unified research paradigm. This "invisible worker" critique arose as part of a larger indictment of archaeologists' tendency to treat subjects of study as "faceless blobs" (Tringham 1991: 94). Ruth Tringham's famous faceless blobs dovetailed nicely with the industrial age's anonymous proletarian masses of de- and unskilled laborers. Critics looked at detailed analyses of machines or schematic drawings of industrial processes produced in HABS/HAER surveys, and the only people they "saw" were the tiny figures included for scale in isometric drawings that illustrated the studies. They rightly faulted scholars of IA for continuing to write "big man history" that focused upon the inventors, engineers, capitalists, and political leaders that built large and complex technological systems, ignoring the contributions of mute workers or the social negotiation of work. Today, industrial archaeologists regularly turn their attention to the "plurality of power" in industrial capitalism and its communities (Cowie 2011; Shackel 1996).

The routine act of doing IA can illuminate the presence of these past "invisible workers." Students excavating in a corner of the molding shop ruins at the historic West Point Foundry uncovered a molder's shovel embedded in a pile of sand. The shovel had been abandoned by a foundry worker as he walked away from the pile of

[6] Super Square Ironworks: 545 Broadway, Newburgh, NY 12550, USA; mail address: Super Square Corporation, PO Box 636, Beacon, NY 12508, USA (845) 565-3539.

Fig. 8.2 Michigan Tech industrial archaeology students, both undergraduate and graduate, draw upon experiential learning activities, such as making these molds for casting aluminum at Super Square Foundry in 2006: (**a**) Lindsay Kiefer coats a wooden pattern and mold with parting compound as Amy Lahey prepares molding sand; (**b**) Lindsay sifts sand into the mold before packing it around the pattern; (**c**) Stephanie Atwood removes the pattern from the packed mold; (**d**) Dean Andersen pours metal into the molds (photos courtesy of Michigan Technological University)

molding sand he had been shoveling nearly 100 years earlier. Serendipitous moments like these in the field, and others much more mundane, forge an affinity between students and the daily lived existence workers in the industrial past. Field students who have been heaving shovels full of dirt themselves for weeks begin to make the

connection between their labors and those of former workers at the site. In this way, the sensory connection to place shared through the act of physical labor again embodies the industrial landscape.

We design our field school to blend experiential learning opportunities with traditional archaeological training of skills like mapping, drawing, and excavating. When combined with the peer mentoring from the nontraditional students in our learning community, and to a lesser extent the emotional learning from the physical labor, the field school creates a powerful combination that resists Tringham's faceless blobs. Students begin to understand different ways to "see" the individuals that inhabited a workplace without theorizing them into predetermined boxes in order to understand them. Our field schools almost always involve taking the students out of the industrial core and considering the connections of the workplace and the forces of production to surrounding communities, households, families, and landscapes, linking production and reproduction and the local with the global.

Both Beaudry (2005) and Hardesty (2000) have advocated for bringing multiple voices into IA. Multivocality should not only include focusing academic attention on how people negotiated social power, gender, ethnicity, and identity when they worked in industrial jobs. A truly multivocal IA also values the multiple ways in which people relate to and understand those stories and experiences. A "postprocessual" or "processual plus" archaeology should value different ways of "seeing into" the industrial past.

We try hard to get students to put aside seductive academic debate and first explore the different ways of relating to the material residues of industry. They learn to "see" a blast furnace or steam engine through the eyes of a foamer; see work process through an engineer's eyes; recognize artisanship from things, as one craftsperson can do using the work of another; and struggle with monotonous days thrusting wheelbarrows of brick over rough ground. Then they can "see" the critiques and concerns of social reformers, environmentalists, capitalists, critics, progressives, theorists and artists, and identify the social, economic, and political divisions and unities that may have existed within a landscape of work beyond simple binary distinctions between labor and capital. The most interesting research occurs at the intersections of those various ways of seeing. We believe these ways of seeing will help young professionals develop meaningful relationships with members of descent communities and other stakeholders in the heritage they study or manage.

8.7 Resistance! Resistance!

There is no doubt that IA thrusts students directly into contentious areas of American culture, particularly perspectives on work. We admire our colleagues who position their research in these contentious areas, working collaboratively to produce new knowledge about industrial heritage sites or industrial societies. Exemplary projects include the Colorado Coal Field War by the Ludlow Collective (McGuire and

Reckner 2003; Walker and Saitta 2002), The Levi Jordan Plantation Project (McDavid 2004), and the collaborative archaeology of homeless communities (Zimmerman et al. 2010). The archaeologists working on these projects have very different perspectives and generally would not consider their research to be part of IA. We are working with our students to generate new understandings of the industrial world however, not reinforcing traditional disciplinary boundaries.

During one of the early seasons studying West Point Foundry, periodic shouts drifted through the trees, "Hey… Do you know what this is? Resistance!!!" Surveyors occasionally called to the rest of the team, reporting a newly discovered broken beer bottle or parts of a stolen shopping cart. At the time, the giggling was perplexing. Only later did we realize that students were teasing each other about a particular archaeological report in which the author had identified recovered artifacts as material residue of workers' resistance to management control. In the learning environment of the field school, this mix of students – undergraduate and graduate, traditional and nontraditional – had developed a collaborative critique. While their individual interests varied regarding the hidden transcripts of resistance, they had decided as a group that they did not like the simplistic way this particular author (or authors) had linked recovered objects with the power relationships in an industrial community and workplace. In a complex, social working environment like the West Point Foundry, the field team had decided that such a monolithic view of capital and labor seemed hopelessly naïve (Fig. 8.3).

Field school learning is situated learning. The best-designed research project serves multiple stakeholder communities, with specific care to collaborate with members of communities underrepresented in university life.[7] Most American

[7] The success of the "Dig Where You Stand" and "study circle" movements in Sweden (and related programs in Denmark, Norway, and Finland) is still little known in the United States as models for public archaeology in industrial communities. The "Nordic Tradition" has old roots in the region (Burchardt and Andresen 1980:25–29). Between 1945 and 1970, Folklore and Oral History programs involved tens of thousands of Scandinavians in documenting the transformation of life consequent to industrialization. Following Gunnar Sillén's publication of *Stiga vi mot ljuset: Om documentation av indusrti- och arbetarminnen* [Towards the light we ascent: On documentation of industry and workers' memories] in 1977 and Sven Lindqvist's publication of *Gräv där du Står: Hur man utforskar ett jobb* [Dig where you stand: How to explore a job] in 1978, a popular and widespread movement arose which involved collectives of industrial workers who collaborated with "Working Life" Museums and The Workers' Educational Association (collaboratively run by the Swedish Social Democratic Party and several trade unions). By 1984, there were more than 1,000 community study groups in Sweden involved in archaeological, historical, genealogical, and oral history research, writing factory histories, biographies of industrial workers, and social histories of their own communities. Anna Storm estimated that between 10,000 and 100,000 people were inspired to this movement because it transformed regular people into *creators* of heritage, rather than *consumers* of cultural history, performances, documentation projects, or interpretations produced by intellectuals and professors (Storm 2008:39–43). By comparison, Cossons (2007:13) noted our current lack of academic insight into the motivation of avocational industrial archaeologists that set up local IA organizations throughout UK in the 1950s and 1960s, but recalled that the Workers' Educational Association had played an important role (cf. Speight 1998, 2004).

Fig. 8.3 The annual field school focuses upon many different types and scales of industrial work: (**a**) students excavating a kiln at a family-operated pottery in rural Parowan, Iron County, Utah, in 2009; (**b**) a research team excavates the enormous cupola furnace base in the Casting House Complex at the West Point Foundry, Cold Spring, New York, in 2007 (photos courtesy of Michigan Technological University)

industrial communities include people of widely varied backgrounds with dramatically different ideas about work, labor, and the relations of production, like our field school research teams. Some individuals hate any idea of corporate paternalism. Others believe that communities can and should be designed to mitigate the hazards of industrial life. Many believe that direct collective action is the best method for improving one's living conditions. An equal proportion believes strongly in the ennobling power of work, viewing work as still fundamental to Americans' self-identity and collective thoughts about society. Despite these deeply held and conflicting ideas, the field school produces new knowledge about industrial society through constructive collaborations. Because archaeological fieldwork contains inescapable and essential ambiguities, these varied people work together (and usually comfortably) to reconcile their perspectives on understanding what we are learning. This happens despite the crushing rhetoric of modern social discourse encountered in 24-7 cable TV punditry and the incessant vitriolic spew of internet discussions. We think this happens for several reasons. Field school labor is intensive, as we mentioned, and it is authored. One's journal and paperwork enter the permanent research archive. The work also takes time. Without the anonymity and brevity provided by modern media and styles of discourse, people are generally civil and constructive, even during passionate disagreements.

We almost always undertake our field schools as public archeology. In addition to confronting issues of class and identity politics among themselves, students and team members constantly find themselves negotiating public tours of industrial heritage sites. Visitors come to see our archaeological digs at the foundry, mine, mill, smelter, fishery, pottery, or wherever, and they bring their ideas: anger over environmental degradation or over environmental regulations; beliefs in the ennobling or emasculating power of work; blame directed at labor unions or Wall Street investors and multinational corporations for ruining domestic industry; a sublime or romantic attachment to the scale or landscapes of industrial production; hatred or love for globalization; or convictions about the perceived evils or benevolence of corporate paternalism, religious institutions, or company towns.

We challenge students to engage with people from these different perspectives, meeting them respectfully as equals. We also model these attitudes ourselves, demonstrating the value of different intellectual perspectives. We discuss research themes and field methods from the social sciences, humanities, engineering, and design. We value the different perspectives of our colleagues, including those building generalized patterns of human behavior, weaving microhistorical or biographical narratives, applying frameworks from evolutionary biology, positioning an activist scholarship of political economy, or studying the social construction and evolution of technological systems. Echoing the thoughts of Ronald Reno in his study of charcoal burners in Nevada's Eureka mining district, when "[t]aken together, this diversity of approaches and sources produce[s] a historical ethnography of a functioning industrial culture" (Reno 1996: 317). Similar to the functioning of industrial cultures of the past, students come to realize that industrial landscapes today, like yesterday, are more about negotiation than resistance.

8.8 "Don't Trip on the Mining Machinery While Enjoying the Virgin Splendor of This Wilderness!" Or "…and Then the Test Trench Groundwater Dissolved the Styrofoam Coffee Cup!"

IA also puts field school students at the center of cultural debates about industrial production and environmental sustainability. Industrial heritage complicates often-easy alliances between heritage preservation and environmental restoration or open-space movements. These tensions are perfectly captured in The Michigan State Historic Site marker along the road into the Porcupine Mountains State Park. The marker reads in part, "Machinery, rock dumps, and old adits are ghostly reminders of forty mining ventures in the years from 1846 to 1928…. Some logging took place around 1916…. Finally in 1945 the area was made a state park to preserve its virgin splendor." The students in our most recent field trip found this paradoxical marker hysterical, as they trudged into the woods to see this virgin (that is unsullied, unspoiled, modest, and initial) example of industry in the woods of far northern Michigan.

Students usually come to our field school with a simplistic notion of "industry vs. environment." That industry despoils nature has been a widely held belief in American society, a belief that has deep roots in western intellectual tradition (Glacken 1967) and took its current form following the birth of the modern environmental movement (Carson 1962). All productive activities leave communities with ecological legacies, economic challenges, and social problems.

Ultimately, all industrial heritage sites represent failures. While some factories operated longer than others, or perhaps one mine returned more on investment than another, all industrial operations eventually end. The natural resources are extracted and what remains cannot be profitably won on an industrial scale. Manufacture eventually becomes too expensive, facilities outdated, and capital flees to cheaper markets. IA often brings research teams to "brownfields," "Superfund sites," and other degraded and contaminated landscapes that by no stretch of the imagination can be considered "virgin," yet contain great potential to yield material evidence of human industrial activity (Quivik 2000, 2007; Symonds 2004, 2006; White 2006).

Many of these sites and landscapes pose serious threat to people's health. We tell our students a story about IA and urban-sites archaeology in which the Styrofoam cup serves as the punch line about the hazards of doing archaeology in urban and industrial settings. In this archetypal story, a colleague working in the backhoe trench began to develop a headache and noticed a funny smell. The crew chief passed down an empty coffee cup for the person to scoop up a groundwater sample that they could later have analyzed. In a matter of seconds, chemicals in the water dissolved the Styrofoam cup. Everyone immediately scrambled out of the excavation and work came to a halt as the team realized they were facing a potential medical emergency.

Unfortunately, this story is neither allegorical nor is it exaggerated; rather this cautionary tale and others like it serve to warn IA students away from a cavalier

"cowboys of science" mentality that can be found in both general archaeology and IA. We think that English archaeologists led the way addressing health and safety concerns, when the Council for British Archaeology published a pamphlet explaining legally required safety requirements (Fowler 1972). Through the 1990s in the United States, a growing list of professional publications drew attention to the heath hazards of both field- and museum-based studies involving archaeological (McCarthy 1994; Flannigan 1995; Poirier and Feder 2001), forensic (Fink 1996; Walsh-Haney et al. 2008), and ethnographic or natural history collections (Odegaard and Sadongei 2005). In the United States, the caviler archaeological mentality began to wane as professional practice developed largely within the Society of Professional Archaeology, particularly in their publication, the *SOPA Newsletter* (cf. Murdock 1992; Garrow 1993; Fink and Engelthaler 1996) and *Federal Archaeology* (cf. Flannigan 1995). This trend culminated in the publication of *Dangerous Places: Heath, Safety, and Archaeology* (Poirier and Feder 2001). Safe and professional practices have begun to percolate into introductory field manuals to varying degrees.[8]

All archaeology conveys risks to health and safety: confined spaces excavation, pathogens and occupational diseases, unstable historic architecture, temperature stress, sharp tools, toxic plants and venomous animals, and even the crew's social practices are all concerns (Langley and Abbott 2000). By its very nature, however, IA will more often bring professional, student, and avocational practitioners into contact with hazardous threats. One half of *Dangerous Places* examines hazards posed by colonial and industrial activity (of particular note are Hatheway 2001; Roberts 2001; Saunders and Chandler 2001; Reno et al. 2001). Industrial processes like tanning leather, making paper, dyeing textile, extracting metals for ore, and founding steel all involve chemicals like amyl acetate, sulfuric and other acids, hydrogen chloride, benzene, naptha phenol, toluene, and elements such as lead,

[8] Typical examples of health and safety concerns addressed in these books include *brief* mentions of regulations regarding excavations in deep trenches (Black and Jolly 2003:61, 64–65; Carmichael et al. 2003:52; Purdy 1996:96); recommendation to get a tetanus booster and pay up on your insurance policy (McMillon 1991); a discussion of disease risk and prevention, proper tool use, hygiene, and a paragraph about deep trenches, Occupational Safety and Health Administration (OSHA) standards, state safety checklists, and legal liability waiver forms (Hester et al. 1997:110–112); discussions of employee safety training, regulations and shoring regarding deep excavations, cold temperatures, and working in the woods during hunting season (Neumann and Sanford 2001:68, 160–161, 186–189); and emergency first aid and strategies for dealing with disaster (Kipfer 2007:171–179, 193, 212). British and Australian archaeologists have done a much better job including careful discussions of safety and health issues, and we point to Roskams's (2001:82–92) extensive discussion of issues in a dedicated section of his manual, but also point to the fact that he has also made themes of safe and careful professional practice a regular part of the narrative throughout the book. Heather Burke and Claire Smith, along with Larry Zimmerman, also included extensive discussion about health and safety issues in their field handbooks (Burke and Smith 2004; Burke Smith and Zimmerman 2007:134, 194–196; Smith and Burke 2007:96–108, 117–123). This last set of books also hints that field manuals with discussions of Industrial Archaeology and Urban Archaeology among the spectrum of archaeological practice give more serious thought to health and safety policy and practice (along with those directed toward students seeking to become Cultural Resources Management professionals).

arsenic, mercury, chlorine, and chromium. We deal with so much rusted iron that we strongly recommend TETANUS vaccinations for all team members and we occasionally had discussions about unexploded ordinance (UXO) while at the West Point Foundry; fortunately however, we have not lead a field crew into a highly contaminated site. Team leaders should research and anticipate health and safety risks posed by each new project. This should be part of their preparations for the study, often in collaboration with environmental scientists and public health professionals. Many government health services and NGOs also provide ready access to information about occupational health.[9]

As a department, we created the Ph.D. in Industrial Heritage and Archaeology, in part, to establish closer ties between the academic study of industrial heritage sites and social and environmental consequences of industrial wealth production. Industrial activities transformed (and continue to transform) the world as never before in the human experience. While our students might study a particular industrial site or community, they also face the living community's struggles with the consequences of producing industrial wealth in a capitalist world. Heritage preservation seems to be a great idea, and archaeological heritage easily links with intangible cultural heritage and environmental heritage conservation, until effluent from a heritage site is linked to cancer in children living downstream. Those same youngsters, however, live as part of an industrial community with rich and textured relations to their heritage sites and landscapes, as does any other stakeholder group or decent community with any other type of heritage. "Hard places" and landscapes, as Robertson (2006) wrote, often become enduring expressions of shared physical work, risk, and sacrifice that are important to family and community.

Individual students on Michigan Tech's IA Field Teams are forced, along with the project as a collective, to reconcile the fact that academic research is performed in the contemporary world. Creating new knowledge includes social and political outcomes beyond academic research questions. Students are shocked to find that some community stakeholders see them as neocolonial tools of the wealthy, urban, and educated elite that employ environmental or historic preservation laws to preserve quaint, picturesque landscapes for vacation, while other community members are happily bending the field school process to meet their own private political or social objectives. The subtleties and complexities of these social negotiations are normal in IA, and projects must often struggle to reconcile advocacy for environment and advocacy for various descendent-, local-, and other stakeholder communities (McGuire with the Ludlow Collective 2008: 216–217).

[9] Examples of these resources include The United States Department of Labor's OSHA publication of standards and guidelines for excavation as well as standardized format guidelines for Material Safety Data Sheets (MSDS) for chemicals. The MSDS format includes information on handling and storage, toxicity, fire risk, and first aid procedures and has been widely adopted by other government and NGO groups, such as the provincial health services of Canada (http://msds.ohsah.bc.ca/). The European Agency for Safety and Health at Work (EU-OSHA) and the European Chemicals Agency (ECHA) compiled the standards and practices of member states, including details like the Globally Harmonized System for the Classification and Labeling of Chemicals (GHS).

Our field school research teams are constantly confronted with the question of what is an authentic landscape and how do changing perspectives reflect changing attitudes towards industry. In other words, is an industrial landscape nature despoiled, a landscape of transformation and progress, or something else entirely? As indicated above, most industrial archaeologists understand waste as fundamental to production and therefore wastes are important sources of information about an industrial site. Over the course of the field school, students start to understand the complexities of social constructions like sustainability, toxicity, risk, and heritage and they appreciate the challenges confronting communities trying to make decisions about these sites (cf. Gorman 2001). A community may be proud of its industrial heritage, for example, and some members may advocate for preserving it, but at the same time state environmental officials might require that the industrial landscape be "mitigated" for toxic materials, potentially erasing all traces of past industry.

In Michigan Tech's recent study of the Cliff Mine in Keweenaw County, Michigan, the field teams had to explain to visitors that the United States government's Environmental Protection Agency and the Michigan State Department of Environmental Quality had both determined that stamp sands were leaching metals into Eagle River, contributing to environmental contamination in its watershed. Those agencies required the sands be removed or encapsulated. At the same time, local newspapers printed a press release from our own university which reported that both those agencies had also determined the same stamp sands to be "safe for full body exposure" and approved permits allowing them to be used for the manufacture of asphalt shingles for domestic homes (Gagnon 2010). Residents, descendents, other stakeholders, and students often find these actions contradictory, incomprehensible, and ultimately frustrating. Our field school participants realize that they are doing much more than discovering new knowledge about the industrial past. They are often negotiators or facilitators, helping individuals and various communities of stakeholders navigate these difficult and emotional issues. It is through exposure to this process in the field that students begin to recognize the complexities of balancing questions of environmental, cultural, and economic sustainability as part of IA projects and industrial heritage management.

An increasing number of industrial archaeologists call for research to be centered back in the real world, confronting and engaging social conflicts surrounding the clean-up of waste and the management of existing abandoned industrial structures.[10] We design our field school experiences to put students into situations like these, which require students to help generate new knowledge for academic discussion about industrial history on projects that will also have useful and relevant outcomes

[10] These calls come from both Industrial and Historical Archaeologists concerning environmental remediation, ecological or economic justice (Joshi 2008; McGuire and Reckner 2005; White 2006), economic redevelopment, and cultural revitalization and education (de Haan 2008; Dong 2008; Greenfield and Malone 2000; cf. Gross 2001; cf. Palmer 2000). These issues became increasingly clear as *Industrial Archaeology* grew into *Industrial Heritage* and is therefore increasingly tied to the powerful "design culture" that surrounds adaptive reuse, sustainable redevelopment, and tourism (Conlin and Jolliffe 2011; Hamm and Gräwe 2010).

in the real world. Doing this fieldwork often induces cognitive dissonance in students, faculty, and other research team members. We must all deal with conflicting and seemingly irreconcilable points of view between academic paradigms, real world priorities, and situations such as the "ecological" land agencies that manage industrial heritage landscapes.

8.9 I'm Not Really Doing *Dirt* Archaeology

It is not surprising that dissonance characterizes contemporary perceptions of the broader meaning and value of past industry, industrial labor, and industrial landscapes. The Modern Era, which has been dominated by a global capitalism predicated on increasing industrial production, entangling networks of distribution, and discrepant patterns of consumption, is rife with incongruities and inequities that have become naturalized as part of modern life. As researchers and students studying the historical period, we benefit from a multiplicity of data sources that help to explore the potential meaning and relevancy of industry to both past actors and present participants.

As instructors, we actively introduce students to a broad spectrum of methodological and theoretical approaches from both within the field of archaeology and from other disciplines in the Social Sciences that encourage a multivocal IA. Traditionally, this process of exposure begins with the requirement that all incoming graduate students participate in the annual summer field school. The field school is ideally intended to serve as an initial exposure to a broad IA approach that emphasizes the variety of data sources from which scholarship can grow, e.g., material culture, written records, photographs and photography, architecture and the built environment, oral history, landscape studies, and environmental data, and that these approaches are all part of a multidisciplinary *archaeological* approach. However, summer invariably ends and the realities of the academic year set in.

It is not uncommon in the first weeks or months of a student's tenure in the department to hear some of them dogmatically state "I'm not really doing *dirt* archaeology," referring to the long-standing orthodoxy between IA communities, including a history of technology community centered on machines, buildings, and technological processes; an ethnographic or social history community focused on oral history and testimony; and the community in generalizing historical archaeology that unearths social meaning by moving dirt. In our students we are at once confronted with the historical legacy of a bounded IA established in the study of technological system builders and "their" workers, as a study independent from archaeological investigation. Our students gravitate to one professor or another, hitching their careers to one funded project or another, targeting jobs with agencies, companies, or future academic departments. The students tend to surrender the holistic and interdisciplinary view of archaeology.

Some students are fascinated by current academic debates in which some scholars wish to refocus IA on the social experience of industry and the negotiation of

community or the identity politics of consumerism and consumption (cf. Casella and Symonds 2005). Others feel a powerful romantic attachment to industrial ruins, like so many international artists drawn to the picturesque decay of abandoned industrial facilities and the poetic "purposelessness of places of work stranded by abandonment" (Cossons 2007: 18). A few strive to understand a particular type of technology or sector of industrial production. Many feel increasing urgency as with the sudden shifts brought about by the current "Great Recession," seeking to help industrial communities with development while preserving tangible remains.

As younger scholars in one of the leading programs in this field, we embrace the necessity of positioning IA as a research endeavor that emphasizes the multiple voices of the past and the importance of this past in a multivocal present. However, while we enthusiastically broaden the perspective of IA to include the social dynamics of industrial life, we should not abandon the established strengths of the field, including an interest in the history of technology and the social construction of technological systems. An IA that combines the compelling systems-oriented thinking of contemporary social theories with the insight of narrative-based historical studies of individuals or technological systems can help to reduce the mystification and alienation that surrounds the functioning of the economic world-system.

As our students fall into the trap of traditional or emerging academic and bureaucratic niches, we encourage them to continue the multivocal thinking from field school. "Try explaining the complexities of the current global financial crisis," we tell them, "without moving between structural explanations of financial systems; the 'big man' style biographies of people who engineered, facilitated, or managed the collapse; and the individual narratives of people who's lives were transformed by it." These are all essential tools and perspectives if one is to understand the story of life in an industrial, capitalist world.

8.10 Conclusions

After years of directing IA field schools, we have become convinced that we should encourage students to approach the industrial past as multilayered landscapes. Upon these landscapes, we approach the physical and social environments of workplace, neighborhood, and community as products of the negotiation between local, regional, and global phenomenon and people. Documenting local processes enables students to demystify the "postindustrial world" and serves to reassert the fundamental connections between producers and consumers, both past and present, as participants in a capitalist world-system. In this sense, *both* the act of doing IA research in a place *and* the intellectual questions posed in IA both deconstruct the myth of a "postindustrial" world.

Developing field schools for a postcolonial IA will be one of our greatest future challenges. IA, and by extension, field schools in IA have the potential to further our understanding of the contemporary world by considering industry from alternate vantage points that move beyond the privileged perspective of Western industrial history. The IA of the future will need to view industrial history from the perspective

of both the "core" and the "periphery." This will mean moving IA research into geographic regions, modes of production, and industries that have been traditionally outside the realm of IA studies. Moreover, these studies will need to explore the global ramifications of industrialization by elucidating the diverse ways in which variables such as race, ethnicity, gender, and class, along with processes such as colonization, globalization, and Westernization, came to increasingly structure people's lives under capitalism.

Most arguments over how to define IA are rooted in the basic question of who should "control" the study of material remains of industrial life, who should set the agenda by which we measure our success. We agree with Cossons (2007) that IA derives its intellectual vigor from its diverse participants, both applied and academic. The discovery of new knowledge about the industrial world, both topical and theoretical, must be linked to practical and tangible outcomes for descent and stakeholder communities.

In teaching our field schools, we do not try to insert a new master narrative to replace those that have come before, but instead seek to reinforce our existing connections and establish new voices in the discussion. We must also consider that field schools disadvantage certain groups of students. Students studying for engineering degrees, those from working class backgrounds, and nontraditional students all have obligations or commitments that prevent their participation in a 6-, 8-, or 12-week field school programs away from campus during the summer.

We must expand our existing collaborative learning projects, particularly by deemphasizing the exclusivity of remote field schools and undertaking more local archaeological fieldwork during the academic semester. The goal should be to create more inclusive field schools that integrate students as part of collaborative teams, working with people from many perspectives and institutions, in an environment that encourages both experiential and intellectual learning.

IA is a vibrant area of international scholarship driven by the conviction that the development and spread of industrial society is the most significant global transformation in human history. This research is also occurring amid the extraordinary deindustrialization of developed regions and the transformative development of other communities around the world. Ultimately, field schools in IA should create a multivocal atmosphere in which students can produce new knowledge while also tackling real world problems related to those experiences.

Acknowledgments The authors wish to thank Harold Mytum for the opportunity to contribute to this important volume. We are grateful to our colleagues and students in the Department of Social Sciences at Michigan Technological University and our other collaborators and supporters for all that they have contributed over the years. We would like to single out Patrick Martin, Elizabeth Norris, Steven Walton, Paul White, and Susan Martin for their contributions to 10 years of collaborative teaching of field schools at the West Point Foundry archaeological site, as well as all the many other research team members we cannot list here. The Scenic Hudson Land Trust supported our collaborative research during those years, and we are grateful for their commitment to archaeological study and public outreach. Sean Gohman has been a critical collaborator in our design of a public archaeology field program at the Cliff Mine site. The Cliff Mine project is supported by Heritage Grant from the Keweenaw National Park Advisory Commission and gifts from LSGI Technology Venture Fund L.P., Joseph and Vickey Dancy, Paul LaVanway, and Bill and Eloise Haller.

References

Alfrey, J., & Putnam, T. (1992). Industrial culture as heritage. In J. Alfrey & T. Putnam (Eds.), *the industrial heritage: Managing resources and uses* (pp. 1–39). London: Routledge.

Areces, M. Á. Á., & Tartarini, J. D. (Eds.). (2008). *Patrimonio Industrial en Iberoamérica: Testimonios de la memoria del trabajo y la producción*. Buenos Aires: Museo del Patrimonio de AySA/UNCUNA.

Ashmore, W., Lippert, D. T., & Mills, B. J. (Eds.). (2010). *Voices in American archaeology*. Washington: Society for American Archaeology.

Beaudry, M. (2005). Concluding comments: Revolutionizing industrial archaeology? In E. Casella & J. Symonds (Eds.), *Industrial archaeology: Future directions* (pp. 301–314). New York: Springer.

Black, S. L., & Jolly, K. (2003). *Archaeology by design*. The Archaeologists toolkit 1. Walnut Creek: AltaMira Press.

Buchanan, A. (2000). The origins of industrial archaeology. In N. Cossons (Ed.), *Perspectives on industrial archaeology* (pp. 18–38). London: Science Museum.

Buchanan, A. (2005). Industrial archaeology: Past, present, and prospective. *Industrial Archaeology Review, 28*(1), 19–21.

Burchardt, J., & Andresen, C. E. (1980). Oral history, people's history, and social change in Scandinavia. *Oral History, 8*(2), 25–29.

Burke, H., & Smith, C. (2004). *The archaeologist's field handbook*. Crows Nest: Allen & Unwin.

Burke Smith, H. C., & Zimmerman, L. J. (2007). *The archaeologist's field handbook*. Walnut Creek: AltaMira Press.

Carmichael, D. L., Lafferty, R. H., III, & Molyneaux, B. L. (2003). *Excavation*. The archaeologists toolkit 3. Walnut Creek: AltaMira Press.

Carson, R. (1962). *Silent spring*. Boston: Houghton Mifflin.

Casella, E. C. (2006). Transplanted technologies and rural relics: Australian industrial archaeology and questions that matter. *Australasian Historical Archaeology, 24*, 65–75.

Casella, E. C., & Symonds, J. (Eds.). (2005). *Industrial archaeology: Future directions*. New York: Springer.

Cerdà, M. (2008). *Arqueología Industrial: Teoría y Prática*. València: Universitat de València.

Conlin, M. V., & Jolliffe, J. (2011). *Mining heritage and tourism: A global synthesis*. New York: Routledge.

Cossons, N. (2007). Industrial archaeology: The challenge of the evidence. *The Antiquaries Journal, 87*, 1–52.

Cowie, S. (2011). *The plurality of power: An archaeology of industrial capitalism*. New York: Springer.

Crandall, W., Rowe, A., & Parnell, J. A. (2003). New frontiers in management research: The case for industrial archaeology. *The Coastal Business Journal, 2*(1), 45–60.

de Haan, D. (2008). Ironbridge institute heritage archaeology course. In J. af Geijerstam (Ed.), *The TICCIH seminar on training and education within the field of industrial heritage* (pp. 34–38). Resource document. TICCIH. Retrieved April 1, 2011, from http://www.mnactec.cat/ticcih/docs/1255330147_stockholmedsem.pdf

Dong, Y. (2008). The status and problems of the research on industrial heritage in China. In J. af Geijerstam (Eds.), *The TICCIH seminar on training and education within the field of industrial heritage* (pp. 39–41). Resource document. TICCIH. Retrieved April 1, 2011, from http://www.mnactec.cat/ticcih/docs/1255330147_stockholmedsem.pdf

DuLong, J. (2009). *My river chronicles: Rediscovering America on the Hudson*. New York: Free Press.

Ebert, W., & Bednorz, A. (1996). *Kathedralen der Arbeit: Historische Industriearchitektur in Deutschland*. Tübingen: Wasmuth Verlag.

Fink, T. M. (1996). Rodents, human remains, and North American Hantaviruses: Risk factors and prevention measures for forensic science personnel – A review. *Journal of Forensic Sciences, 41*, 1052–1056.

Fink, T. M., & Engelthaler, D. M. (1996). Health issues in Arizona archeology: Update 1995. *SOPA Newsletter, 20*(1/2).
Flannigan, J. (1995). What you don't know *can* hurt you. *Federal Archaeology, 8*(2), 10–13.
Fowler, P. (1972). *Responsibilities and safeguards in archaeological excavation*. London: Council for British Archaeology.
Gagnon, J. (2010). Alumnus teams with tech to reclaim stamp sand and grow an industry. *Michigan Tech News*. Electronic document. Retrieved September 15, 2010, from http://www.mtu.edu/news/stories/2010/august/story30658.html
Garrow, P. H. (1993). Ethics and contract archaeology. *SOPA Newsletter, 17*(9/10), 1–4.
Gassan, R. H. (2002). The birth of American tourism: New York, the Hudson Valley, and American culture, 1790–1835. PhD dissertation, *Electronic doctoral dissertations for UMass Amherst.* Paper AAI3056228. Retrieved September 27, 2007, from http://scholarworks.umass.edu/dissertations/AAI3056228
Glacken, C. J. (1967). *Traces on the Rhodian shore: Nature and culture in western thought from ancient times to the end of the eighteenth century*. Berkeley: University of California Press.
Gordon, R. B., & Malone, P. M. (1994). *The texture of industry: An archaeological view of the industrialization of North America*. New York: Oxford University Press.
Gorman, H. S. (2001). Conflicting goals: Superfund, risk assessment, and community participation in decision making. *Environmental Practice, 3*, 27–37.
Greenfield, B., & Malone, P. (2000). "Things" that work: The artifacts of industrialization. *OAH Magazine of History, 15*(1), 14–18.
Gross, L. (2001). Industrial archaeology: An aggressive agenda. *IA: The Journal of the Society for Industrial Archaeology, 27*(1), 37–40.
Hamm, O., & Gräwe, C. (2010). *Bergbau Folge landschaft/post mining landscapes*. Berlin: Jovis-Verlag.
Hardesty, D. L. (2000). Speaking in tongues: The multiple voices of fieldwork in industrial archaeology. *IA: The Journal of the Society for Industrial Archaeology, 26*(2), 43–47.
Hatheway, A. W. (2001). Former manufactured gas plants and other coal-tar industrial sites. In D. A. Poirier & K. L. Feder (Eds.), *Dangerous places: Health safety, and archaeology* (pp. 137–156). Westport: Bergin & Garvey.
Hester, T. R., Shafer, H. J., & Feder, K. L. (1997). *Field methods in archaeology* (7th ed.). Mountain View: Mayfield Publishing Company.
Joshi, M. (2008). The case for salvaging the remains of the world's worst industrial disaster as Bhopal, India. *TICCHI Bulletin, 43*(winter), 1, 8.
Killion, T. W. (2008). *Opening archaeology: Repatriation's impact on contemporary research and practice*. Santa Fe: School for Advanced Research.
Kipfer, B. A. (2007). *The archaeologist's fieldwork companion*. Malden: Blackwell Publishers.
Komatsu, Y. (1980). Industrial heritage of Japan. *Industrial Archaeology Review, 4*(3), 232–234.
Langley, R. L., & Abbott, L. E., Jr. (2000). Health and safety issues in archaeology: Are archaeologists at risk? *North Carolina Archaeology, 49*, 23–42.
Lindqvist, S. (1978). *Gräv där de Står: hur man utforskar ett jobb*. Stockholm: Bonnier.
Martin, P. (1998). Industrial archaeology and historic mining studies at Michigan Tech. *CRM Magazine, 21*(7), 4–7.
Martin, P. (2001). The importance of networking and the American IA experience. In M. Clarke (Ed.), *Industriekultur und Technikgeschichte in Nordrhein-Westfalen, Initiativen und Vereine* (pp. 107–110). Essen: Klartext-Verlag.
Martin, P. (2009). Industrial archaeology. In T. Majewski & D. Gaimster (Eds.), *International handbook of historical archaeology* (pp. 285–297). New York: Springer.
McCarthy, J. P. (1994). Archaeologists in Tyvek: A primer on archeology and hazardous materials environments. *SOPA Newsletter, 18*(2), 1–3.
McDavid, C. (2004). From "traditional" archaeology to public archaeology to community action: The Levi Jordan plantation project. In P. A. Shackel & E. Chambers (Eds.), *Places in mind: Public archaeology as applied anthropology* (pp. 35–56). New York: Routledge.
McGuire, R. H., & Reckner, P. (2003). Building a working class archaeology: The Colorado Coal Field War Project. *Industrial Archaeology Review, 25*(2), 83–95.

McGuire, R. H., & Reckner, P. (2005). Building a working class archaeology: The Colorado Coal Fields War Project. In E. C. Casella & J. Symonds (Eds.), *Industrial archaeology: Future directions* (pp. 217–241). New York: Springer.

McGuire, R., & The Ludlow Collective. (2008). Ludlow. In R. McGuire (Ed.), *Archaeology as political action* (pp. 188–221). Berkeley: University of California Press.

McMillon, B. (1991). *The archaeology handbook: A field manual and resource guide*. New York: Wiley.

Murdock, B. (1992). Lime disease prevention. *SOPA Newsletter, 16*(7), 1–3.

Neumann, T. W., & Sanford, R. M. (2001). *Practicing archaeology: A training manual for cultural resources archaeology*. Walnut Creek: AltaMira Press.

Nisser, M. (1983). Industrial archaeology in the Nordic countries, viewed from Sweden. *World Archaeology, 15*, 137–147.

Odegaard, N., & Sadongei, A. (Eds.). (2005). *Old poisons, new problems: A museum resource for managing contaminated cultural materials*. Walnut Creek: Alta Mira Press.

Oviedo, B. (2005). El patrimonio industrial en México. 20 años de estudio, rescate, reutilización y difusión. *Industrial Patrimony, 13*(7), 25–40.

Palmer, M. (2000). Archaeology or heritage management: The conflict of objectives in the training of industrial archaeologists. *IA: The Journal of the Society for Industrial Archaeology, 26*(2), 49–54.

Palmer, M. (2010). Industrial archaeology and the archaeological community: Fifty years on. *Industrial Archaeology Review, 31*(1), 5–20.

Palmer, M., & Neaverson, P. (1998). *Industrial archaeology: Principles and practice*. London: Routledge.

Poirier, D. A., & Feder, K. L. (Eds.). (2001). *Dangerous places: Health safety, and archaeology*. Westport: Bergin & Garvey.

Purdy, B. A. (1996). *How to do archaeology the right way*. Gainsville: University of Florida Press.

Quivik, F. (2000). Landscapes as industrial artifacts: Lessons from environmental history. *IA: The journal of the Society for Industrial Archaeology, 26*(2), 55–64.

Quivik, F. (2007). The historical significance of tailings and slag: Industrial waste as cultural resource. *IA: The journal of the Society for Industrial Archaeology, 33*(2), 35–52.

Reno, R. L. (1996). *Fuel for the frontier: Industrial archaeology of charcoal production in the Eureka Mining District, Nevada, 1869–1891*. PhD dissertation, Department of Anthropology. University of Nevada, Reno.

Reno, R. L., Bloyd, S. R., & Hardesty, D. L. (2001). Chemical soup: Archaeological hazards at Western ore-processing sites. In D. A. Poirier & K. L. Feder (Eds.), *Dangerous places: Health safety, and archaeology* (pp. 205–220). Westport: Bergin & Garvey.

Roberts, M. (2001). Beneath city streets: Brief observations on the urban landscape. In D. A. Poirier & K. L. Feder (Eds.), *Dangerous places: Health safety, and archaeology* (pp. 157–168). Westport: Bergin & Garvey.

Robertson, D. (2006). *Hard as the rock itself: Place and identity in the American mining town*. Boulder: University Press of Colorado.

Roskams, S. (2001). *Excavation*. Cambridge manuals in archaeology. Cambridge: Cambridge University Press.

Saunders, C., & Chandler, S. R. (2001). Get the lead out. In D. A. Poirier & K. L. Feder (Eds.), *Dangerous places: Health safety, and archaeology* (pp. 189–204). Westport: Bergin & Garvey.

Scarlett, T. J. (2007). Teaching the African diaspora and its consequences: Thoughts about entangling education. *African Diaspora Archaeology Newsletter*. December 2007. Digital Resource. African Diaspora Research Network. Retrieved May 25, 2011, from http://www.diaspora.uiuc.edu/news1207/news1207.html#4

Seely, B., & Martin, P. (2006). A doctoral program in industrial heritage and archaeology at Michigan Tech. *CRM: The Journal of Heritage Stewardship, 3*(1), 24–35.

Shackel, P. A. (1996). *Culture change and the new technology: An archaeology of the early American industrial era*. New York: Plenum Press.
Smith, C., & Burke, H. (2007). *Digging it up downunder: A practical guide to doing archaeology in Australia*. New York: Springer.
Speight, S. (1998). Digging for history: Archaeological fieldwork and the adult student, 1943–1975. *Studies in the Education of Adults, 30*(2), 68–85.
Speight, S. (2004). Teachers of adult education in British universities, 1948–1998. *Studies in the Education of Adults, 36*(1), 111–127.
Storm, A. (2008). *Hope and rust: Reinterpreting the industrial place in the late 20th century*. Stockholm Papers in the History and Philosophy of Technology, Royal Institute of Technology, Stockholm.
Symonds, J. (2004). Historical archaeology and the recent urban past. *International Journal of Heritage Studies, 10*(1), 33–48.
Symonds, J. (2006). Tales from the city: Brownfield archaeology, a worthwhile challenge? In A. Gren & R. Leech (Eds.), *Cities in the world, 1500–1700* (pp. 235–248). Leeds: Maney Publishing.
Thomas, D. H. (2000). *Skull wars: Kenewick man, archaeology and the battle for native american identity*. New York: Basic Books.
Tringham, R. (1991). Households with faces: The challenge of gender in prehistoric architectural remains. In J. M. Gero & M. W. Conkey (Eds.), *Engendering archaeology: Women in prehistory* (pp. 93–131). Oxford: Blackwell Publishers.
Walker, M., & Saitta, D. J. (2002). Teaching the craft of archaeology: Theory, practice, and the field school. *International Journal of Historical Archaeology, 6*(3), 199–207.
Walsh-Haney, H., Freas, L., & Warren, M. (2008). The working forensic anthropology laboratory. In M. W. Warren, H. A. Walsh-Haney, & L. E. Freas (Eds.), *The forensic anthropology laboratory* (pp. 195–212). Boca Raton: CRC Press.
Weisberger, J. (2003). Industrial archaeology masters program, Michigan technological university: Leading the way in a developing genre. *Journal of Higher Education Strategists, 2*, 201–206.
White, P. J. (2006). Troubled waters: Timbisha shoshone, miners, and dispossession at warm spring. *IA: The Journal of the Society for Industrial Archaeology, 32*(1), 4–24.
Zimmerman, L. J., Singleton, C., & Welch, J. (2010). Activism and creating a transnational archaeology of homelessness. *World Archaeology, 42*(3), 443–454.