
Of the many fields that exist in the academic world today, history of science is one that naturally invites a certain amount of cross-disciplinary sharing or interaction. There was a time not more than a few decades past when students were not permitted to even contemplate pursuing the history of physics, for example, without possessing formal training in physics itself. In more recent years, science and technology studies has emerged as a reasonably well-defined scholarly domain where the tools of sociology, philosophy, anthropology, and other disciplines have been brought to bear on historical case studies in an effort to make sense of the production, dissemination, or circulation of natural knowledge in various contexts. The mix of approaches and movement back and forth across disciplinary boundaries has produced scholarship that has both enriched our understanding of past scientific practices and raised new questions regarding some of our most fundamental assumptions about what science is and how it operates in the present.

At the same time as we celebrate the interdisciplinarity of such work, we are reminded that writing in the history of science has also been seen from further afield as intellectually narrow, overly specialized, and disconnected from broader historical and social issues. In a commentary written in 2005, Steven Shapin lamented the trend in the profession toward what he called “hyperprofessionalism,” the signs of which include high levels of “self-referentiality, self-absorption, and a narrowing of intellectual focus.” Few readers on the outside, he reasoned, are likely willing or able to do the intellectual work necessary to make sense of the fine historical points often made or to appreciate the connections to their own fields in the highly specialized works which increasingly find their way into print. An excessive inward focus leaves us with a profoundly unhappy situation given the insights history of science could offer scholars in neighboring disciplines (as well as the educated public) about the intersections between science, culture, expertise, and so on. Teaching Children Science directly addresses and attempts to overcome this growing insularity. In this work, Sally Gregory Kohlstedt chronicles the rise of nature study across the United States from the 1890s through the 1930s; her analysis focuses on schools, especially public schools, as key social and cultural spaces where science was systematically disseminated to a mass audience of pupils in the country’s rapidly expanding educational system.

The importance of education as a social and intellectual activity has often gone underappreciated (though not neglected entirely) in the history of science. The topic has routinely been treated by professional historians as tangential to the operations of science, the process of education being viewed often as mere dissemination or popularization, activities that have their place and are worth thinking about, certainly, but things that happen nonetheless on the outside or at the border of the science–non-science divide. It has been the hard work of “real” knowledge production that has occupied the attention of most historians of science, who typically touch on education only in connection with the institutions in which scientists typically work. In such instances, consideration of institutional structures or programs has entered their stories only to the extent that they figure in some theoretical breakthrough or in the way they channel various forms of patronage. Other times they serve simply as background to the personal or political activities of notable individuals. In these cases the educational setting more often than not serves as backdrop to the knowledge-making activity itself.

A small number of historians, however, have recently made a case for elevating pedagogy as a category of scholarly analysis. There is much to be gained, they argue, by looking deliberately at the ways in which scientific work and educational processes have interacted at different places and points in time. Cyrus Mody and David Kaiser, among this group, have insisted (taking their cue from Kuhn and Foucault, among others) that we need to see teaching and research activities as “mutually reliant.” “The exigencies of one activity,” they insist, “strongly inform the practice and content...
of the other.\(^3\) Along these lines, scholars have examined, for example, how particular modes of graduate training have instilled in novice researchers disciplinary norms and expectations, how they build and maintain the “ethos” and character of a research community. Others have looked at the way in which representational tools or calculation techniques developed for pedagogical purposes have been taken up by a scientific group and subsequently transformed its intellectual practice. Still others have traced the manner in which widely adopted presentations of science in schools and museums have worked to shape the conceptualization of elite research in a field—science from the bottom up rather than the top down.\(^4\)

These examples illustrate, as Mody and Kaiser point out, the range of interactions that need to be considered as historians begin to study just how science education functions at the boundaries between professional communities and the people seeking to join them. Yet still missing from this growing body of work is a fuller accounting of a qualitatively different kind of science education. In the histories alluded to above, the focus is squarely (and unapologetically) on technical reproduction as it relates to practice.\(^5\) These historians, in other words, are sifting through the various formal and informal educational structures and pedagogical routines to find things that help us understand how science works. The histories are undoubtedly richer as a result of this attention to education, but they still give only a one-sided view: science education for the growth and maintenance of research groups. Largely neglected in this history-of-science-pedagogy renaissance, as Kathy Olesko has labeled it, is the consideration of how science education has operated for purposes other than technical reproduction.\(^6\)

The bulk of science teaching, in fact, takes place in settings outside of laboratory groups, graduate seminars, and research centers, and for reasons other than disciplinary maintenance, technical training, and knowledge production. This “other” kind of teaching is aimed at the citizens who visit museums and science centers and the students who populate elementary, secondary, and even college classrooms. This other educational work, existing at the boundary between the scientific community and the non-scientific public, functions not to promote research nor to train up new generations of scientific workers. Rather its purpose is to negotiate the relationship between science and the public. Teaching Children Science seeks to explore the social and cultural space where this happens. Kohlstedt’s book, then, is doubly needed. It not only ventures into the fascinating interdisciplinary space between history of science and education, but it begins to redress the imbalance that exists in the recent emphasis on science pedagogy being advanced by scholars in the field.

In this book, Kohlstedt tells the story of a group of scientists and science educators who launched an entirely new subject in the schools of North America. Moving from early popularization efforts in the American naturalist tradition of the 1800s (covering Louis Agassiz’s work with teachers as well as early nature books and magazines for children) to the more formal school science structures in the 1930s, she offers what she calls an institutional account of the circumstances that led to the widespread dissemination and adoption of nature study as a novel approach to science teaching in schools. The movement, she explains, was contemporaneous with the rise of the professional education and science establishments in America, with the pressures for social reform prevalent during the progressive era, and with the rise of science writ large as a source of cultural authority. She reports on the key individuals who set out the pedagogical principles, curricular guides, and instructional exemplars of nature study and provides a wealth of detail about the people on the ground—the teachers and supervisors—who implemented this new subject. This story, twenty years in the making, gives us a fine-grained look at the ideas and individuals, as well as the institutions, professional apparatus, and educational settings that came together in various ways to bring the study of the natural world to children in the decades around the turn of the twentieth century. Kohlstedt’s work is a marvel of archival research and scholarly analysis.

For readers unfamiliar with nature study, the first question that arises, perhaps, is its definition and domain—a question not easily answered. One of the strengths of Kohlstedt’s treatment is her willingness to explore the ambiguities and haziness that ran through the movement. “No single or simply defined program,” she writes, “served to dominate or universalize nature study as educational theorists and grade-school teachers expressed their particular interpretations and worked within their own natural environments” (p. 3). At the most general level, Kohlstedt explains that the movement rested on a turn away from student learning via formal disciplinary structure. Classification and systematics, definitions and vocabulary were passed over in favor of exposing students directly to objects and organisms, most often as they were found in their natural settings. The ideal learning outcomes—informed by the new educational psychology of the era advocated by the likes of G. Stanley Hall and others—were more often aesthetic, affective, and even tactile than cognitive or rational. It was a hands-on pedagogy of natural things in local settings and the connections that could be made between those things and the interests of children.

While these broad descriptions offered by Kohlstedt provide insight, they fail to provide a solid grasp of the meaning of these teaching activities. More useful in this respect are the examples Kohlstedt analyzes as she traces the emergence and subsequent decline of this embrace of nature.

She begins in Chicago, a crucible of progressive-era educational reform, with the work of a handful of educators and scientists who were seeking to develop new forms of schooling for children. Bringing a commitment to object teaching with him from Germany to Chicago (by way of Quincy, Massachusetts), noted education leader Francis Parker established innovative models of pedagogical instruction as director of the Cook County Normal School. His recruitment of Wilbur Jackman from a teaching post in Pennsylvania opened the door to the intensive development of an, elementary-level science curriculum centered on the nature-study ideal. As Kohlstedt explains, Jackman’s nature study sought to integrate all school subjects so that they connected directly to students’ lives, engaged their natural curiosity, and promoted a love of nature; it required children to go out into the world and obtain their knowledge firsthand. A tireless advocate for his approach, he published detailed curricular guidelines in his 1891 book, Nature Study for the Common Schools, organized and worked with Chicago school teachers to help them implement his version of nature study in their classrooms, and made the rounds of national and local professional meetings promoting the nature-study ideal. After Parker and Jackman joined the University of Chicago School of Education, alongside John Dewey who remained there until 1904, Jackman continued to advocate for his particular brand of elementary science instruction until his untimely death.

A very different kind of nature study developed far from the Chicago Midway under the direction of the Johns Hopkins University graduate Clifton Hodge. As Kohlstedt narrates, Hodge accepted G. Stanley Hall’s invitation to become an assistant professor at

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2. See, for example, Warwick (2003), Kaiser (2005a), Gordin (2004); and Nyhart (2009). Perhaps the definitive collection of this sort of work is Kaiser (2005b).
3. The exception here is Nyhart (2009).
Clark University in the industrial town of Worcester, Massachusetts. Hall, one of the founders of “child study” then in vogue, urged Hodge to consider the problems of science education in urban areas. With this charge Hodge developed activities that centered on reconciling the growing tensions between industrial and natural environments. Students, in one instance, were directed to explore the geography of the city block on which they lived to better understand how humans modified their surroundings to suit their needs. His version of nature study was less focused on connecting to some ideal of nature; and it had even less to do with generating a romantic or aesthetic appreciation of the outside world. It sought instead to make children aware of the utility of things. Kohlstedt tells of students engaged in projects such as mosquito abatement in their community. Formal instruction on the life cycle of the pest gave students the knowledge required to disrupt mosquito reproduction by draining swamps or introducing oil onto the surface of standing water around town to kill the larval form of the organism. This type of nature study, Kohlstedt explains, was “as much about civic and individual enhancement as it was about the natural sciences” (p. 74).

Heading west from Worcester, Kohlstedt visits upstate New York where another community of nature-study advocates coalesced in the 1880s. Liberty Hyde Bailey and Anna Botsford Comstock were the towering figures of the Finger Lakes region and arguably the most widely known representatives of nature study nationwide. With rural America losing population to the burgeoning urban centers of the time (partly as a result of a slumping agricultural economy), Bailey and Comstock wielded nature study as a tool to revitalize interest in rural life and culture. Supported with funds from a concerned New York state legislature, Comstock and Bailey disseminated their nature-study program a variety of ways: distributing leaflets through the state extension office; working directly with teachers and junior naturalist clubs; and through two seminal books that defined the Cornell approach: Bailey’s slim *Nature Study Idea,* published in 1909, and Comstock’s massive *Handbook of Nature Study,* which came out in 1911. Bailey saw nature study less as a pathway into science proper than as a pedagogical approach grounded in observation and appreciation of the various elements of country life. This rural incarnation of nature study advanced the poetic and aesthetic qualities of natural settings in an effort to cultivate in students a sympathetic attitude toward nature, a sentiment aligned with the nascent conservation movement in the United States.

Each of these instantiations of nature study, enacted in places from Chicago to Ithaca and beyond, were pitched to different audiences and for different purposes. Whether the goal was the conscious engineering of the urban environment, as it was with Clifton Hodge in Worcester, or to stir a sense of romance to stem the exodus of people from rural farming communities, this new type of science education at its heart was about helping citizens manage their relationship to the world in which they lived (or, perhaps more accurately in true progressive tradition, to manage the citizens themselves). It drew on science to look outward to the community, rather than being concerned with the internal practices of science or the scientific community. *Teaching Children Science* richly illustrates this other kind of science education—that concerned with what science, or in this case nature, could contribute to how the broader public saw and lived in the world. Kohlstedt’s contribution in this regard is remarkably important.

The geographically dispersed instances of nature study sketched above only begin to cover the material presented in the book. Kohlstedt’s diligent research has uncovered a raft of institutional details and individual initiatives. Particularly strong is her description of the machinery of the movement. She connects nature study to the book culture of the time, from the growth of the textbook industry around the turn of the century to the genre of animal stories that were written with an eye to creating, in her words, “an empathetic bond between nature and the audience of children” (p. 135). She examines the expanding network of normal schools in this era and looks at how the unique mission of these institutions to train elementary school teachers provided both an avenue for the widespread dissemination of nature-study pedagogy as well as opportunities for the professional advancement of a new generation of mid-level school supervisors and administrators, the majority of whom were women. The expansion of these opportunities, of course, did not come without resistance, which Kohlstedt documents as well. The book, in addition, traces the professional trajectory of the movement’s flagship journal, *The Nature-Study Review* (which ran from 1905 through 1923), and its corresponding professional society, the American Nature-Study Society. As the movement gained a national reputation, it flowed beyond the confines of formal school settings into 4-H programs, summer camps, and youth organizations like the Boys Scouts and Girls Scouts, organizations that sustained and nurtured the ideal of having citizens connect with the natural world around them.

Yet even as I commend this book for what it has to offer audiences of all kinds, I can not avoid noting that Kohlstedt clearly missed an opportunity to realize the cross-field potential of her story. The manner in which she explores the assorted manifestations of nature study and the broad argument she makes about the movement’s importance, in the end, betrays a measure of the academic narrowness that Shapin laments. Missing from her account in particular are important perspectives from scholars who study the history of education.

Take her claims about the significance of nature study in schools. She opens the book with the bold statement: “The nature study movement introduced science into public schools of North America.” Two-hundred-and-thirty-six pages later, she sums up her account with equal emphasis, writing that as a result of nature study, “systematic study of the natural world . . . was presumed to be an essential part of the public school experience of every child from the earliest grades through high school.” These are no small claims, and they come surprisingly unqualified. The suggestion that nature study—long overlooked in the history of education according to Kohlstedt—was *the* path along which the study of natural science made its way into public schools is simply not warranted by the historical record. While I appreciate Kohlstedt’s desire to see nature study recognized for its role in bringing science into classrooms, that role is more limited than what she suggests. Science enjoyed a formal place in the course of study, particularly in high schools and academies, well before nature study appeared on the scene. This fact has been well documented by Kim Tolley in her book, *The Science Education of American Girls,* and others. Nature study’s presence was limited primarily to elementary schools, and even at that level, it was preceded by sustained efforts to teach natural science as early as the 1870s. School science teaching had a life, in other words, prior to the arrival of nature study. To be fair, Kohlstedt sprinkles appropriate hedges throughout the interior chapters of the book. But she does so reluctantly, it seems, not wishing to undermine the attention-grabbing argument that bookends her story.

It is in a similar vein that she uses nature study as an all-encompassing category into which she assigns objects and activities like

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8 Kohlstedt, 1, 236.

9 Tolley (2003).
roof-top gardens, window boxes, field trips, object teaching, hands-on learning, museum study, agricultural education, and nearly any other science-related school activity or technique she came across in her research. Some of these were indeed closely connected to nature-study practices in particular local contexts or programs. But many of these enterprises existed as important elements of science teaching completely separate from nature study as well. “Hands-on” science teaching, to take one example, was a crucial element of the laboratory method of instruction that became widely popular in the 1880s. Laboratory instruction permeated high schools through the early 1900s and extended even to the elementary level in some instances. This approach constituted a movement unto itself, and it existed side-by-side with nature study around the turn of the century before it began to fade.10

The gradual evolution of science teaching (as educators drew on new psychological theories of the time and got their professional legs under them) is a complex story that can not be reduced to the nature-study model offered here. The story of Clifton Hodge and his urban nature study, for example, would be more appropriately contextualized within these broader trends as a bridge to the new subject of general science (and civic science) rather than, as Kohlstedt describes, as a simple variant of nature study. Hodge’s version of science teaching embraced a civic engineering ideology that marked a new direction in the school curriculum, one that sought to distance itself sharply from the kind of science instruction advocated by Wilbur Jackman, Anna Botsford Comstock, and Liberty Hyde Bailey. The subject of physiography as an important introduction to science in schools prior to the emergence of general science is similarly left unexamined. One gets hints of all this in Teaching Children Science, but only hints. Very little escapes Kohlstedt’s broad, nature-study brush.11

It is not obvious whether the bold claims and singular view of science education are merely the result of an over exuberance in finally being able to tell the nature-study story—an inadvertent excess (suggested perhaps by her editors?)—or the result of an unfortunate professional myopia. Kohlstedt is surely aware of much of what I have pointed out. She cites in her notes and the text itself some of the works that document pre-nature-study science education (Tolley [2003], for example), and throughout her book she alludes to many of the pedagogical approaches and alternative versions of school science that operated alongside of and in competition with nature study. But her stories and footnotes, at the same time, are surprisingly empty of scholarship from the history of education (and even parts of the history of science). Missing are important works by Kathryn Olesko, Herbert Kliebard, Jonathan Zimmerman, and Ellen Lagemann, to mention only a few, all of which I expected to encounter at least once but never did.12 I want to be clear that Teaching Children Science does make valuable contributions to the historical scholarship on science education in America. But a more catholic scholarly approach might have enabled it to truly hit the sweet spot where history of science and history of education meet.

References


11 On the general science movement, see Heffron (1995) and Rudolph (2005b). The emphasis on civic goals in science education at this time are described in Pauly (1991) and Shapiro (2008).