



# Preparing Vocational Training for the Eco-Technical Transition

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*Nancy Lee Wood*

Over the coming decades, in the face of climate change, resource depletion, and economic contraction, the kinds of things that people will need to know and the standard approaches to accessing that knowledge will change. As people seek new and innovative ways of building sustainability and resilience into their lives and within their communities, they will encounter a widening variety of educational choices.

In the foreseeable future, the role of conventional university and graduate programs as credentialing agencies will undoubtedly continue, but this will become less standard as learners tap into alternative educational venues that offer streamlined instruction within shorter time frames and at relatively lower cost. Some of those alternative learning experiences will take place through new or reworked programs in academia, while others will occur in nontraditional settings such as Internet-based instruction, institutes, workshops, and community-based opportunities. Some will lead to degrees and certificates, while others will not. Regardless of the venue, the focus most likely will be on eco-technical education: applying science to meet human needs while minimizing ecological disruption.

In short, education is in the process of transformation, not only in what is learned, but in how and where learning takes place. The critical questions are: “What kinds of knowledge and skills do people need for the Anthropocene, an epoch in which humans are dramatically altering the climate and the environment? Are there educational models currently in existence that could be ramped up quickly to meet the challenges before us? And

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how might we hasten their implementation in the midst of conventional cultural lag?

Tackling the numerous societal and ecological challenges that lie ahead requires a fundamental shift in educational priorities. New teaching practices and training programs are needed to enable growth in four key areas of vocational education: workforce development; carbon mitigation through energy efficiency and green buildings; regenerative land management and sustainable agriculture; and peace and conflict management. By providing students with the practical skills and knowledge that they need in these critical areas, we can better prepare them for the potentially very different world of tomorrow.

## Education for Workforce Development

As we move further into the Anthropocene, work is likely to become more localized as fossil fuel energy constraints alter labor activity and mobility. Some work, such as agriculture, will become more labor intensive, and the types of preparation for work will be more streamlined, with training and education concentrated on information that is relevant to a specific job or set of skills. The awarding of four-year and advanced college and university degrees is likely to decline as large numbers of young people seek this training and knowledge through other avenues.

Already in countries such as the United States, where a college education has been touted as the sure way to a financially secure future, young people and their families are increasingly questioning the value of an expensive four-year degree, as graduates face strangling student loan debt, underemployment or unemployment, and stagnating wages. Worldwide, youth labor markets have suffered since the 1970s, but they were particularly hard hit with the Great Recession of 2007. In the European Union, just under one in five young workers (18.8 percent) are unemployed on average, with the highest rates of joblessness in Greece (50.3 percent), Spain (43.9 percent), and Italy (39.2 percent). Youth unemployment averages are even higher in poorer regions of the world, particularly in the Middle East (28.2 percent) and North Africa (30.5 percent).<sup>1</sup>

Undoubtedly, many types of labor need to be performed, and many workers need to be trained, to ensure a sustainable future. Ultimately, all sectors of labor—from bread baking to carpentry to banking—will have to go through some degree of transformation to coalesce with ecological demands. In the meantime, numerous lucrative midlevel jobs that need to be done and that

require specific vocational skills remain unfilled and could be “greened.” This gap can and must be closed.

The Organisation for Economic Co-operation and Development (OECD), in its *Skills Beyond School Synthesis Report*, emphasizes the critical role that post-secondary vocational education will play in the coming years. The OECD reports that nearly two-thirds of employment growth in the European Union will be within the category of technicians and associate professionals. The projection for the United States forecasts that by 2018, one-third of job vacancies will require some type of post-secondary qualification, but not a four-year college degree. Student populations are likely to decline at four-year institutions as learners seek more affordable and more targeted options.<sup>2</sup>

As high school vocational training programs have waned over the past several decades in the United States, community colleges have increasingly become training centers of choice in traditional areas such as criminal justice, culinary arts, dental hygiene, and nursing. Many community colleges now offer courses or program concentrations in environmental studies, green engineering, water quality training, and sustainable agriculture. While most community colleges also offer degree programs in liberal arts and general studies with the intention of students going on to four-year institutions, the vocational degrees and certificates are designed to move students into the labor force soon after graduation. The structure of community colleges is ideal for relatively short-term, low-cost vocational training; however, many of these programs fail to provide substantial hands-on experience in the field.<sup>3</sup>

One way to provide such experience is through apprenticeships. The Technical and Vocational Education Training (TVET) strategy developed by the United Nations Educational, Scientific and Cultural Organization (UNESCO) addresses the need for young people throughout the world, particularly in developing countries, to become skilled workers through quality



Austin Community College

Students in the Austin Community College Veterinary Tech program learn skills while helping out at the Bastrop County Animal Shelter, Texas.

apprenticeships. TVET focuses on the crisis of widespread youth unemployment in much of the world, along with the problem of skill mismatches. It aims to promote work-learning schemes as a necessary way to reduce poverty, stimulate economic recovery, and foster sustainable development. Recognizing that “one size does not fit all,” TVET encourages a wide range of skills development from basic to advanced levels that are congruent with regional, national, and local socioeconomic, geopolitical, and cultural realities. Moreover, TVET, connecting with UNESCO’s Global Action Programme on Education for Sustainable Development (ESD), promotes skills and knowledge for sustainable development.<sup>4</sup>

One of the most successful efforts to provide hands-on apprenticeships as a viable path from school to career comes from Germany. Through the country’s highly respected dual-education model, learners can take on apprenticeships in numerous fields where they combine one or two days a week of academic classroom instruction at a vocational school with three or four days of practical experience within a company or organization that offers vocational training. More than three hundred and fifty such programs are available, and most apprenticeships require a two- to three-and-a-half-year commitment, although a few require longer periods of training. While learning their trade and becoming socialized into the expectations of their field, apprentices receive an allowance from their training company that averages about 650 euros per month, depending on the field. Frequently, apprentices who successfully complete their training are offered permanent positions within the company, and, provided that they are successful workers, they can later train to become masters in their fields, qualifying them for managerial positions. These hands-on apprenticeship experiences are important in developing a well-trained workforce while providing meaningful and lucrative employment for youth.<sup>5</sup>

In concert with TVET goals, Barefoot College, a unique and highly successful model of education for self-sufficiency in rural communities, has been developed in India and is spreading to other countries. It empowers the poor—especially women—by demystifying and making technical knowledge accessible, helping to improve the lives of thousands of villagers in some of the poorest, most remote parts of the world. (See Box 18–1.)<sup>6</sup>

Worker cooperatives—enterprises that are owned and run jointly by their members, who also share the profits and benefits—span many economic sectors and can play an important role in vocational training that is geared toward the coming eco-technical transition. New York City’s Green Worker Cooperatives, a nonprofit organization that helps worker-owned green businesses get

### Box 18–1. The Barefoot Model

Barefoot College is a not-for-profit, grassroots social enterprise that has been providing basic services and solutions to the challenges facing rural poor communities for more than forty years, with the objective of making them self-sufficient and sustainable, valuing and respecting the knowledge and wisdom that they already possess. The College was founded in 1972, and today it has campuses in four countries, including its main campus in Rajasthan, India.

Barefoot College believes in keeping alive the lifestyle and work ethic of Mahatma Gandhi by offering down-to-earth, collective and applied, practical learning experiences. The College demonstrates—from the knowledge, skills, and wisdom of village elders and young participants alike—that simple, inexpensive solutions are more sustainable. The College often is shown as an example of what is possible if very poor people, who have never been to school, are allowed to develop themselves. It is a concept that has stood the test of time.

What the College has effectively demonstrated is how sustainable the combination of traditional knowledge (“barefoot”) and demystified modern skills can be when the tools are in the hands of those who are considered “very ordinary” and are written off by urban society. Just because someone is illiterate does not mean she cannot be a solar engineer, architect, designer, communicator, computer technician, or builder of rainwater harvesting tanks. There are many more powerful ways of learning than the written word.

The formal system of education demeans and devalues traditional knowledge, village skills, and practical wisdom that the poor value, respect, and apply for their own development. Just because it is not “certified” does not mean it is inferior. Village knowledge and skills have been respected and applied for hundreds of years, well before the certified urban doctor, teacher, and engineer turned up in the villages.

Barefoot professionals include educators, doctors, night school teachers, solar engineers, water drillers, architects, designers, midwives, masons, communicators, hand pump mechanics, computer programmers, and accountants. Tens of thousands of students have passed through the College and are productive, responsible members of rural society.

In rural India, 60–70 percent of children do not attend school during the day. Instead, they help their families with essential activities, such as collecting firewood or drinking water. Formal school traditionally has not been perceived as a valuable use of the children’s time. But they have time to attend school at night.

Since 1979, the Barefoot Night Schools have educated more than seventy-five thousand children, three-quarters of them girls, making learning accessible to all and relevant to young people in poor rural areas. The Night Schools’ unique approach exposes the children to how village institutions work. Through an elected children’s parliament with a twelve-year-old prime minister, they learn about democracy. Currently, some eight

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**Box 18–1. continued**

hundred and fifty villages have solar-lit night schools, and more than three thousand Barefoot teachers are reaching twenty-five thousand children who are going to school for the first time. In addition, the Night Schools employ more than nine hundred traditional communicators, with evening puppet shows helping to educate more than one hundred thousand people in remote villages where there is no television and no newspapers.

Barefoot College also has been in the process of expanding the role of education to help empower women not only to survive, but to thrive. It is the only college of its kind in the world. There is no other place of learning where illiterate rural women from some of the most inaccessible villages in the world can learn how to be solar engineers in six months using only sign language. The focus is on giving opportunities to rural women and providing them with skills usually identified with men. Sophisticated technologies such as fabricating solar lanterns, cookers, and heaters are no longer complicated for the illiterate rural women to handle, repair, and maintain.

Barefoot College trains women only between ages forty and fifty, because more mature village women tend to stay with their families in the village. Men, on the other hand, tend to use skills to find work outside the village and to send money home. Women often have more patience, are more skilled with their hands, and, the older they are, are more respected and listened to more seriously.

Barefoot College's solar engineering students come from poor families with little or no educational qualifications. No translation, no interpreters, and no written language is required. They learn with their hands. They are practical and intelligent and willing to learn, showing enormous patience. Once they are trained, they are less likely to leave their communities, because they have been given a chance to prove their worth to their own communities. Many graduate knowing more about fabricating charge controllers, inverters, and solar lanterns than graduates of five-year university programs.

Using the Barefoot College approach, nine hundred and twenty-four Solar Mamas have been trained from seventy-two countries. They have solar-electrified more than sixteen hundred remote villages all over the world, and, in the process, they have become powerful change agents of the future.

—*Bunker Roy, founder of Barefoot College*

*Source: See endnote 6.*

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started in underresourced communities, serves as a boot camp for budding entrepreneurs. Trainees get five months of expert training, which includes one-on-one mentoring with successful entrepreneurs, legal assistance with structuring and business incorporation, support in fundraising and branding, access to a peer-support network, and name recognition and visibility

for their cooperative. Worker cooperatives likely will become increasingly popular as traditional privately owned businesses face economic contraction and continue to downsize their operations. Green worker cooperatives could become a critical solution both to youth unemployment and to meeting sustainability needs.<sup>7</sup>

## Creating a Generation of Carbon Mitigation Specialists

Reducing carbon emissions through the use of renewable energy sources, the redesign and retrofitting of buildings, the adoption of green transportation systems, and the development of sustainable technological innovations must be at the core of the transformation to a viable future. Fortunately, in many of these areas, work is already under way. According to a report by the International Renewable Energy Agency, there were 8.1 million jobs worldwide in the field of renewable energy in 2015, and this figure is likely to double by 2030.<sup>8</sup>

Numerous degree and nondegree programs in North America and Europe are geared toward providing renewable energy training and education. Examples include one- to nine-day workshops on renewable energy, green buildings, sustainable ecological design, and alternative construction methods at the Solar Living Institute in Hopland, California; a bachelor of science degree in Energy and Environmental Management at the University of Central Lancashire in the United Kingdom; and a master's degree specializing in wind energy at the National Technical University in Athens, Greece.<sup>9</sup>

In the United States, several community colleges have developed training programs awarding certificates and two-year associate of science degrees in “green” engineering. (See Chapter 22.) In one of the most impressive efforts, Bristol Community College (BCC) in Fall River, Massachusetts, has greened its engineering curricula thanks to a four-year, \$900,000 National Science Foundation grant awarded in 2010. The degrees are in mechanical engineering focused on wind technology, electrical engineering focused on solar energy, and environmental engineering focused on energy conservation. BCC also grants certificates in solar and wind energy.<sup>10</sup>

All BCC engineering students are required to take two basic courses. The first, “Introduction to Sustainable and Green Energy Technologies,” includes the construction/engineering design and implementation process, green building practices focused on energy efficiency, environmental conservation and resource management, and renewable energy. In the second course, “Green Building Practices,” students study the methods, materials, and equipment

used in the construction of residential and commercial buildings, roads, and highways, approaching these from a green lens. They learn about the proper use, selection, specifications, strength and limitations, fire resistance, and code conformity of basic construction materials and fabrication processes. A lab requirement includes fieldwork and basic laboratory testing procedures.<sup>11</sup>

Some students graduating from these programs go on to four-year institutions to continue their studies in engineering, having obtained a firm grounding in green technologies. Others go directly into the labor force, finding employment in areas such as wastewater operations, hazardous waste management, underwater remotely operated vehicle design (such as was used in the cleanup operations following the Deep Horizon oil spill off the U.S. Gulf Coast in 2010), computer-assisted drafting, geological surveying, and technical consulting in manufacturing. Such training and work is critical in creating a viable ecological future, and the time investment and cost for preparation at a community college is relatively minimal. If face-to-face tutelage is not possible, many options are available for online and distance learning training in the fields of renewable energy and building retrofitting. The American Society of Civil Engineers and Green Training both offer short-term online trainings.<sup>12</sup>

In the area of sustainable transportation, the Transportation@MIT initiative at the Massachusetts Institute of Technology offers undergraduate and graduate students exciting and innovative opportunities to study dynamic systems of mobility for the twenty-first century. Drawing from fifteen departments within the School of Engineering, the Sloan School of Management, and the School of Architecture and Planning, the initiative is multidisciplinary and offers coursework in areas such as sustainable energy, the environment, safety, green technology and infrastructure, information systems, economics, settlement patterns, urbanization, social structure, globalization, and political and personal behaviors. The emphasis is on moving people efficiently and promoting access to goods and services while simultaneously preserving and restoring the environment. Graduates typically go into government, business, and academia with careers in research, design, development, planning, and consulting.<sup>13</sup>

The Institute for Transportation Studies at the University of California-Davis also is paving the way in education toward sustainable transportation. Although its main focus is on research, it offers an interdisciplinary graduate program in Transportation Technology and Policy that draws from thirty-four disciplines. Emphasis is on improvements in network efficiency, use of high-efficiency vehicles, substitution of alternative fuels, use of alternative modes

and multimodal transport, incorporation of sustainable designs, and efficiency in integrating transportation systems with land use. Graduates go on to work in diverse sectors including public agencies specializing in ecological research and natural resources, city planning and environmental analysis, conservation organizations, environmental consulting firms, and legal practices specializing in environmental issues.<sup>14</sup>

## Regenerative Land-Use Management and Sustainable Agriculture

Reducing carbon emissions through the use of renewable energy sources, green buildings and transportation systems, and sustainable technologies have become familiar soundbites for responding to climate change. In contrast, little-to-no public discourse has focused on regenerative land management, a strategy that goes beyond adapting to the “new normals” of worsening heat waves, droughts, intense storms, and floods and offers a means to “re-green” the planet through holistic land-use practices—such as regenerative agriculture, holistic grazing, restoration of prairies and wetlands, and reforestation—that capture and retain carbon in the soil. Carbon sequestration holds the promise of restoring ecosystems that can actually reverse global warming while also developing healthy soils through the reintegration of biodiversity, the reestablishment of nutrient cycles, and increased water retention. This process also can enhance food production, helping to improve food security and to diminish hunger and famine.<sup>15</sup>

Although regenerative land management is not mainstream, it is starting to develop. A growing number of college and university courses and programs are focused on sustainable agriculture, and some also specialize in agroecology, or the growing of harvestable trees and shrubs among or around crops or on pastureland as a way to preserve or enhance the productivity of the land. Beyond the university setting, scores of organizations are working to train communities in regenerating their lands. Some institutions offer study-abroad programs that bring students into rural communities to learn sustainable management practices directly from village farmers and fishermen. (See Box 18–2.)<sup>16</sup>

Perhaps the name most closely associated with regenerative land management is Allan Savory, a Zimbabwean wildlife biologist-farmer who, in the 1960s, identified the causes of degraded and desertified grassland ecosystems throughout the world. By managing livestock to mimic behaviors practiced in the past by vast herds of grazing animals, Savory developed a method to restore

### Box 18–2. Community-based Education in Thailand

Understanding the link between culture (how we live) and ecology (where we live) is a critical part of education for sustainability. The best people to teach about this are the community members who are on the front lines of sustainability. In Southeast Asia, this includes people such as village organic farmers, coastal dwellers who are working to restore mangroves, and tribal people who are conserving watersheds.

Study-abroad programs that focus on experiential learning in specific ecosystems, watersheds, mountain ranges, and island archipelagos have shown that students learn best about ecology and sustainability when exposed to the complexities of the real world beyond the classroom. Community-based education moves beyond this and has the community members themselves play a key role in the education process, from course design to teaching in the field.

By engaging local residents directly and using the tools of participatory research, educators can work as facilitators to help communities discover what they need to teach outsiders about their lives, their struggles, and the ecosystems of which they are a part. Letting “the farmer be the teacher” is tremendously empowering for communities, as they are given a chance to tell their stories and to pass on their knowledge and wisdom. Students benefit from learning directly from practitioners, and community members benefit by learning to better tell their stories to others, from development workers to government officials.

In Thailand, the International Sustainable Development Studies Institute (ISDSI) worked with Bak'er'ya tribal community leaders in Mae Hong Son province to create a course examining upland rotational farming, a practice that is sustainable if managed correctly, but that government officials have vilified as “slash and burn.” These communities, as well as others that ISDSI works with, have found it helpful to participate actively in the teaching of visiting U.S. college students, as this helps them better articulate their issues to skeptical government officials and park administrators. Two local community leaders, Padti Saju and Loong Prapat, noted that this engagement encourages them to keep fighting for community rights to sustainably manage the watershed forests, knowing that outsiders are aware of and support their struggle.

The key to effective community-based education is handing over real control to shape course development to the villagers, empowering them to teach and giving them an opportunity to pass on their local knowledge and their passion for sustainability to visitors from around the world.

—Mark A. Ritchie, Executive Director, International Sustainable Development Studies Institute

Source: See endnote 16.

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devastated land back to health. The Savory Institute, which he founded in 2009 with a small group of associates, is working to develop one hundred self-sustaining Savory Hubs—focused on holistic management—around the world by 2025. By partnering with local individuals and organizations, these Hubs are composed of farmers, ranchers, and land managers who receive, as part of the curriculum, hands-on training and implementation support for both commercial and communal land-based operations. Nongovernmental organizations and government agencies that work with pastoralists also receive training.<sup>17</sup>

The Savory Institute estimates that providing training and support for thousands of practitioners will improve the management of 1 billion hectares of land—approximately one-fifth of all grasslands worldwide. As of 2015, thirty Savory Hubs had been established in fourteen countries (including Argentina, Malawi, Mexico, Turkey, and the United States), with 6.5 million hectares of grasslands improved and more than three thousand land managers trained. The first of these Hubs, the Africa Centre for Holistic Management in Zimbabwe, was cofounded by Savory and provides seminars, workshops, and training programs to help local farmers improve their food and water security and livelihoods by using livestock to regenerate damaged watersheds, wildlife habitats, and croplands.<sup>18</sup>

In urban settings, the U.S. nonprofit Growing Power offers a grassroots, community-oriented model for educating about sustainable agriculture through urban farming. Established in 1993 and based in the Midwestern cities of Milwaukee and Chicago, Growing Power was started by the father-daughter team of Will and Erika Allen and helps urban residents of all income levels grow affordable, high-quality protein and vegetables using sustainable methods. The organization provides job training and life skills to underserved youth via its Youth Corps; it also offers challenging farm-practice internships and develops workshops centered on building community through agriculture.<sup>19</sup>

Reforestation is another critical element in the carbon sequestration equation. The nonprofit group Trees for the Future, based in the U.S. state of Maryland, provides technical knowledge in agroforestry, reforestation, and



Judge Florentino Floro

Joy of Urban Farming is an urban agriculture project managed by the office of the vice mayor of Quezon City, Philippines.

sustainable development and has trained over three hundred thousand families in two thousand communities, mostly in Africa. More than 60 million trees have been planted by these families, and some eighty-seven thousand acres of degraded land have been restored to productive health.<sup>20</sup>

Through concerted efforts to re-green the planet, communities could go a long way toward mitigating the impacts of climate change, promoting biodiversity, and reestablishing the human connection with nature. This work is so critical to the future of humankind that, in the United States, it would be well worth implementing a National Community Resilience Corps, ignited with the vigor and determination of the Civilian Conservation Corps that was mobilized to expand infrastructure and create jobs in the aftermath of the Great Depression. (See Box 18–3.)<sup>21</sup>

## Education for Peace and Conflict Management

In the Anthropocene, we must make peace with the planet as well as find ways to make peace with each other. Regenerative soil management goes a long way toward making peace with the planet, and providing education models that prepare people for meaningful work with viable incomes can contribute to interpersonal and community well-being and reduction in tensions.

Nonetheless, conflicts between and among peoples, groups, and nations are inevitable and can be constructively transformative, taking people to higher levels of understanding and cooperation when the conflicts are well managed. Scholars in peace studies most often define peace not simply as an absence of conflict and violence, but as cooperation that engenders justice and freedom rooted in human rights, equal access to education, and sociopolitical structures that are fair and just. Peace studies as a discipline typically combines anthropology, history, political science, psychology, sociology, and theology as a means to find the roots of conflict, identify underlying causes, create preventive strategies, and teach conflict management skills. More recently, environmental studies has been part of the peace studies academic mix as well.

Many universities around the world offer undergraduate and graduate programs in some aspect of peace and conflict management. These include programs focused on the theory and practice of conflict management, dispute resolution, mediation, and negotiation, as well as programs that offer internships and other practical field experience in areas of conflict so that students can learn these skills firsthand. The United World College of the American West (UWC-USA), a two-year pre-university boarding school in the state of

### Box 18–3. Building a National Community Resilience Corps

In the dark days of May 1934, U.S. First Lady Eleanor Roosevelt expressed deep concern about the lasting impact of the Great Depression on young people, who had no previous experience of rewarding work or prosperous times to recall. “I have moments of real terror when I think we might be losing this generation,” she told the *New York Times*. “We have got to bring these young people into the active life of the community and make them feel that they are necessary.”

Mrs. Roosevelt championed the formation of the National Youth Administration (NYA), which joined the better-known Civilian Conservation Corps (CCS) in providing incomes, skill building, and meaningful work for millions of young people. CCS members planted billions of trees, built or improved facilities at more than eight hundred parks across the United States, and profoundly changed Americans’ appreciation of nature and the value of environmental conservation.

Young people today face their own share of economic and financial challenges, along with other, very real, fears about their future—most notably, the climate crisis. Much has been made of the recent economic recovery, but sixteen- to twenty-four-year-olds have found it more difficult than most other age groups to enter the workforce, with employment in this group falling 9.7 percent from 2000 to 2016. They also are hamstrung by catastrophic levels of student debt, which has risen 423 percent since 2003. At the same time, multiple polls have shown that millennials are more worried than older generations about climate change and strongly favor reducing the use of fossil fuels.

Considering the economic insecurity that even a smooth transition to a post-carbon economy will bring, might it be time to bring back the NYA or the CCS, or to establish something like these for the twenty-first century?

The idea of government-supported service never really went away in the United States. The CCS helped inspire the Peace Corps and continues its legacy in the form of state and local conservation corps across the country. The federal government operates a number of national service programs—most notably AmeriCorps—through the Corporation for National and Community Service. Many of these, along with nonprofit programs such as Green Corps, offer young people opportunities to engage in conservation, environmental education and activism, and even climate adaptation and disaster response efforts.

Although these valuable programs engage thousands of young people every year, we desperately need much more, lest we lose not only this generation, but countless generations to come. The climate crisis presents a challenge that justifies a vast mobilization of the public as much as the Great Depression did. One means of doing this would be to form a National Community Resilience Corps (NCRC), which would harness the untapped passion, creativity, and labor of millions of young people to implement projects to grow

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### Box 18–3. continued

resilience and build sustainability in tens of thousands of communities across the country. The NCRC could expand from the new Resilience AmeriCorps program and provide full-time employment for eighteen- to twenty-five-year-olds for a period of two years.

NCRC members would support the development of a range of community projects, such as:

- Community Resilience Assessments, designed to engage community members in identifying shared values, vulnerabilities, and opportunities for intervention;
- community education, including in the areas of systems thinking, ecoliteracy, and resilience science;
- hands-on soil and energy conservation programs;
- the development of distributed, community-owned renewable energy and food enterprises, along with other critical local and regional services and goods; and
- growing community connections and engagement.

Like other service programs, the NCRC would deliver basic training in community organizing, communications, and specific project-related tasks. Critically, it also would invest in providing foundational education for its members, so that they can: 1) understand the true nature of interrelated environmental, energy, economy, and equity crises of the twenty-first century, and 2) build their capacity to think systemically and apply resilience science and practice to their lives and work. After all, thriving on a changing planet will require a whole new way of thinking.

—Asher Miller, Executive Director, Post Carbon Institute

Source: See endnote 21.

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New Mexico, offers an innovative international baccalaureate diploma with a special focus on peace studies and conflict resolution. Each year, UWC-USA admits some two hundred students, ages sixteen to nineteen, from approximately eighty countries. Respect for diverse cultural, social, and religious backgrounds is central to the school's educational mission.<sup>22</sup>

The Martin Luther King, Jr. Center for Nonviolent Social Change in Atlanta, Georgia, founded in 1968, provides education and training based on Dr. King's nonviolence philosophy and methodology. The Center's Nonviolence 365 Program focuses on youth and helps students realize nonviolence as a lifestyle by facing problems, tensions, conflicts, and violence in nonviolent ways. The program empowers learners to think, speak, and act grounded in nonviolence

while fostering leadership skills. The Center has developed training workshops for youth as well as educational programs for schools: for example, the King Scholars Curriculum aims to help classroom teachers from kindergarten through grade twelve incorporate freedom, justice, and peace education into their lesson plans. Auxiliary tools such as online e-learning modules and speaker series make it possible for people around the world to tap into learning about Dr. King's work and how individual, group, and institutional conflicts can be addressed through nonviolent means.<sup>23</sup>

No doubt, education as we have known it will change as the ecological challenges that we face demand creative thinking and innovative adaptations. The realities of climate change, resource depletion, and economic contraction are upon us—and the clock is ticking. We do not have the luxury of time to postpone doing the work that is needed to stabilize our future. Many short-term educational practices and vocational contributions can lead humankind to long-term gains. We are capable of mustering the courage and stamina that are needed to see us through some destabilizing times ahead, but we must act now.

25. Box 18–2 from the following sources: Morten Asfeldt and Glen Hvenegaard, “Perceived Learning, Critical Elements and Lasting Impacts on University-based Wilderness Educational Expeditions,” *Journal of Adventure Education and Outdoor Learning* 14, vol. 2 (2014); Lisbeth Grundy and Bud Simpkin, “Working with the Youth Service,” in John Huckle and Stephen Sterling, eds., *Education for Sustainability* (London: Earthscan, 2001); Archibald Sia, Harold Hungerford, and Audrey Tomera, “Selected Predictors of Responsible Environmental Behavior: An Analysis,” *Journal of Environmental Education* 17, no. 2 (1985/86): 31–41; Takako Takano, “A 20-year Retrospective Study of the Impact of Expeditions on Japanese Participants,” *Journal of Adventure Education and Outdoor Learning* 10, no. 2 (2010): 77–94; Takako Takano, *Nohsanson-no-hito-to-kurashi-ga-sasae-ru-chiiki-no-kyoikuryoku (Educational Power of Community Based on People and Life in Rural Villages)* (Tokyo: Ecoplus, 2011), 1–26.

26. Gregory Bateson, *Steps to an Ecology of Mind* (Aylesbury, U.K.: Intertext, 1972), 17.

27. Jim Garrison, “The Holy Grail in Education,” *Huffington Post*, March 4, 2014. A review of a survey of 42,257 students aged 18–25 (the millennial generation) from one hundred countries identified substantial disaffection with conventional formal university education. It found that 53 percent of interviewees see a disconnection between what they are learning today versus what they will need tomorrow. The review concluded that, “Universities will need to transform themselves into a place where young people can not only study and take exams, but learn from doing. To provide them with real-world experiences that are relevant.” See YouthSpeak and AISEC (in partnership with PriceWaterhouseCoopers), *Improving the Journey from Education to Employment: Youth-Speak Survey Millennial Insight Report* (Rotterdam: 2015), 32; Stefan Collini, *What Are Universities For?* (London: Penguin Books, 2012); Cristina Escrigas, *A Higher Calling for Higher Education* (Great Transition Initiative, June 2016).

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## Chapter 18. Preparing Vocational Training for the Eco-Technical Transition

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