Training of the human resources based on the green economy.
Designing educational programmes based on environmental protection*

Kształcenie kadr zielonej gospodarki.
Projektowanie programów kształcenia w zakresie ochrony środowiska

Key words: career and technical education (CTE), green jobs, environmental protection, green economy.

Słowa kluczowe: kariera i edukacja techniczna, zielone zawody, ochrona środowiska, zielona gospodarka.

Streszczenie
W dobie gospodarki wychodzącej z kryzysu charakteryzującej się wysoką stopą bezробocia możemy odnaleźć sposoby na ożywienie gospodarcze poprzez inwestycje i szkolenia w zakresie zielonych zawodów. Zauważa się również rosnące zapotrzebowanie na produkty i usługi związane z oszczędnością energii i zasobów naturalnych oraz zmniejszaniem emisji gazów cieplarnianych. W artykule znajdziemy odpowiedź na pytanie, jaki jest wpływ zielonej rewolucji na tworzenie nowych miejsc pracy, na kariерę i edukację techniczną (CTE).

In the midst of a slowly recovering economy, high unemployment rates, and subsiding financial bailouts of banks and large businesses lies a promise of economic recovery through investments and training for a green economy and green collar occupations. Demand is growing at the local, national, and international levels for products and services that conserve energy and natural resources, decrease greenhouse gas emissions, and reduce dependence on foreign oil. Driving the green movement is America’s dependence on imported oil and the associated volatile fuel costs and the growing concern for the well-being of our planet. There are numerous advocates who are thinking green: public policymakers, research scientists, environmentalists, entrepreneurs, financiers, educators, industry leaders and consumers. Every state is experiencing growth in at least one green industry sector, according to a series of state reports released by the National Governors Association Center for Best Practices (Wasserman, 2012). But how real is the impact of the green revolution on job creation and what is the impact of green on career and technical education (CTE)?

Let’s begin with understanding what we mean by green jobs. There are those that caution “the rush to jump on the ‘green’ bandwagon has outpaced the development of a concept of what it actually means to be green” – (Dierdorff et al., 2009). Most definitions of “green” jobs involve protecting the environment and fostering energy independence. For example, the United Nations Environmental Programme (UNEP, 2008) states that green jobs should “contribute substantially to preserving or restoring environmental quality.” Other definitions root the notion of a green economy in products or services that promote renewable resources, reduce pollution, and exist in skilled trades and professional occupations (NASDCTEc, 2009). Green activities can range from recycling/reducing waste to increasing energy efficiency. The emerging green economy encompasses a number of sectors in the workforce, including renewable energy generation, transportation, energy efficiency,

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construction, environmental protection, manufacturing and recycling and waste reduction (see Appendix: Green Sectors).

Green jobs are said to be growing at a faster rate than the whole economy (Melville, 2009) with green innovation occurring in most states. However, the impact of green employment on the total number of jobs available is relatively small. There were an estimated 750,000 “green jobs” in 2006 (Global Insight, 2008). The Obama administration wants to create 5,000,000 new green jobs over the next 10 years. The New York Times (11/14/2009) estimates that if this ambitious goal is met, green jobs will comprise about 3 percent of current workforce levels. By contrast, health care workers of all kinds will comprise more than one-third of all workers. While keeping the green potential in perspective, what are the potential green labor market impacts? There are three.

**Green enhanced-demand for existing occupations.** Many green jobs are occurring in traditional occupations where the context has changed but not the skills. For example, a traditional job of welding a boiler for a coal-fired energy facility could transform into a green-collar job involving welding the components for a wind energy machine, or a traditional blue-collar job of assembling an SUV in an auto plant may be “greened” by assembling a hybrid in the same auto plant. In both examples, the skill sets for the blue- and green-collar jobs are the same as is the training for these jobs. Other possible greened jobs could include:

- All construction workers
- Some manufacturing workers (e.g., tools setters, operators)
- Energy consultants
- Organic farmers
- Extraction workers (e.g., drilling, boring, mining)

**Green enhanced-skills for existing occupations.** Other green jobs will require significant changes to the work and worker requirements of existing occupations. These changes may or may not result in an increase in employment demand for the occupation. The essential purposes of the occupation remain the same; but tasks, skills, knowledge and external elements, such as credentials, may change. An example is the occupation of architect, where greening has increased knowledge requirements pertaining to energy efficient materials and construction, as well as skills associated with integrating green technology into the aesthetic design of buildings. Constructions workers will need to learn “deconstruction” as well as construction skills. Other examples of green enhanced jobs may include:

- Power plant operators,
- Mechanical engineers,
- Auto specialty technicians,
- HVAC engineers and mechanics,
- Precision farming techniques for framers and ranchers,
- Occupational health and safety technicians.

**New and emerging green occupations.** But the green influence will also require unique skills and worker requirements resulting in the generation of a new occupation or one born from an existing occupation. An example would be of solar system technicians who must be able not only to install new technology, but also to determine how this technology can best be used on a specific site (see Appendix: New Green Occupations). The majority of green jobs are expected to emerge from the transformation of existing jobs as skill sets, methods and occupational profiles are redefined. Similarly, the majority of job trajectories in green industries will likely be built into traditional career pathways. Green jobs span a variety of skills, educational backgrounds and occupations. The largest number of new green jobs are projected to be in occupations requiring professional certification, an apprenticeship, or one or two years of postsecondary education. Thus, many of the green jobs are “middle-skilled” jobs meaning they require some postsecondary education or training, but less than a four-year postsecondary degree.

What is good news for our economy and our workforce is that these green, middle skill jobs are less susceptible to being outsourced. While the green industry has been recognized as a high-growth sector in the workforce (Henton, et. al., 2008), reports indicate a shortage of qualified individuals with the necessary skills to work in the green economic market due to the lack of a green-trained workforce (White and Walsh, 2008). The Association for Career and Technical Education’s (ACTE) Issue Brief,
“CTE’s Role in Energy and Environmental Sustainability” (2008) stresses the pivotal role CTE programs can play in producing workers with the skills necessary for green occupations.

At the cornerstone of CTE is its responsiveness to industry trends and workforce needs. CTE can respond to emerging green economy in three ways:
1. “Green” Programs of Study,
2. “Greening” CTE curriculum, and
3. Creating New Green CTE Programs.

Green Programs of Study

Perkins IV, passed in 2006, included the requirement that to be eligible to receive funds, recipients must offer at least one Program of Study (POS) (see Federal Requirements of Programs of Study). The National Research Center for Career and Technical Education’s, Technical Assistance Academy is currently working with five states in their efforts to build capacity for assisting local education agencies and postsecondary institutions in developing “green-focused” POS models for both urban and rural settings. They include:

- Ohio – energy/biotech/agriculture,
- New Jersey – green technologies layered into other industries,
- Oregon – wind/solar/construction,
- Georgia – energy/construction/transportation,
- Illinois – energy/utilities/waste management.


Greening the CTE Curriculum

Green job skills and knowledge built on concepts of sustainability, green technologies, green standards, green processes, and life cycle analysis apply to every current CTE program. One example was described by Konopnicki (2009) where he defined “sustainability” is a new workplace readiness skill and “as such, CTE’s role will be to develop new academic approaches to sustainability and continue to explore alternative curriculum paradigms and career pathway applications” (p. 47).

Green skills and knowledge can be integrated into every existing CTE program or course and built into traditional career pathways to add skills and value for every student. Programs in construction can expose students to green building design, renovation and retrofitting of existing buildings, and energy management. Plumbing could also integrate retrofitting to increase water efficiency and conservation. Students in automotive programs can learn green automotive skills as they work on or build hybrid cars. Electrical engineering programs can incorporate units on wind turbines and solar energy. Culinary arts can incorporate food production using organic and/or sustainable grown agricultural products. Carpentry can be taught using environmentally certified and recycled wood.

In fact, all programs could incorporate the reuse and production of products made from recycled, nontoxic materials as well as techniques to conserve energy. A simple example is switching off several devices that are often used together, such as a PC, a monitor and a printer, with a switchable power bar or surge protector with multiple sockets. This reduces the usage of standby power (also known as vampire power or phantom load) consumed by electronic appliances while they are switched off or in a standby mode.

The curriculum challenge to CTE is not in finding opportunities to integrate green into programs, but rather, how to systematically ensure that every CTE pedagogic opportunity incorporates green. This includes:
- Classroom-based experiences that directly address green.
- CTSO (student vocational organizations) civic or social projects or competitive events that address concepts within their particular industries.
- Work-based learning (e.g., job shadowing, cooperative experience, supervised occupational experience, internships, apprenticeships, school-based enterprises) through careful coordination with the sponsoring business or organization that incorporate green themes as part of the students’ work experience.

Creating New, Green CTE Programs

A third opportunity for CTE is to develop new occupational programs targeted at the small, but growing green sector. In Ohio, for example, a new program in *Energy and Alternative Fuels* has been developed where students study such topics as
- Solar, geothermal, wind, biofuel, hydro, fossil
- Research and development
- Site selection, acquisition and preparation
- Business management and operation

Consistent with effective CTE practice, this program has developed partnerships with important local industries such as American Electric Power, the local solid waste authority, the state department of Agriculture and a private firm, POET Biorefining.

The Green Opportunity for CTE

In addition to integrating green elements into existing programs, CTE can respond to the new and emerging green occupations by creating new green CTE programs where there is sufficient labor market demand and business interest. The “green” opportunity today is to create a new or modify an existing program that starts in high school and leads to industry recognized credentials (certificates, diplomas, associate or bachelor’s degrees) and workforce opportunity.

For such programs to be effective they will need to ensure that curriculum standards meet green industry certification. These programs need to be clearly articulated in pathways that are identifiable as focused on green education. There is a need to identify best practices in green education and there is a greater need for good labor market information to drive the design and delivery of these programs. This will require strategic partnerships with green employers, the K-12 system the community college system as well. In addition we should reach out to state energy and environmental agencies and indeed more broadly to the workforce development system. And all of this has to be guided by a vision of sustainability by the state, by the region indeed all the way down to the locality.

What this calls for is a systems approach to building and strengthening the pipeline that will contribute to the country’s emerging green economy and changing skill needs. A robust career and technical education program of study focused on green is a systems the solution. It will help create framework for new and expanded green career pathways integrate new green skills and competencies into CTE curriculum, it will work with employers to redefine the skills and competencies needed by the green workers and finally, support professional development of teachers in these evolving fields.

There are certainly challenges in this vision of educator preparing the future green workforce. Labor market information on the new and emerging economy is not easily obtainable. This raises challenges for training and educating workers for jobs that do not currently exist in the labor market. There is little standardization of credentials, multiple institutions and train systems providing certificates are certifications, which may or may not be recognized by employers. If you standards that have emerged are mostly for danced professionals and those at the lower levels of career ladders such as those provided by the North American Board of certified energy practitioners. These are challenging indeed difficult further to obtain for those with low academic skills.

Crafting such a program with a curriculum that is horizontally integrated (math and literacy with CTE) and vertically integrated (secondary and postsecondary) and that incorporates educational experiences that are sequential, progressive and non-duplicative meets all the demands of the current
Perkins legislation, and more importantly, meets the needs of today’s students and tomorrow’s workplace.

Appendices

Green Sectors

Dierdorff and colleagues (2009) performed an extensive review of the literature and identified 12 sectors that were consistently mentioned. The following sectors are not independent nor are they meant to be exhaustive: Renewable Energy Generation; Transportation; Energy Efficiency; Green Construction; Energy Trading; Energy and Carbon Capture and Storage; Research, Design, and Consulting Services; Environment Protection; Agriculture and Forestry; Manufacturing; Recycling and Waste Reduction; Governmental and Regulatory Administration

New Green Occupations

- Solar power operations,
- Carbon capture and sequestration (engineers and technicians, maintenance),
- Solar lab technician,
- Photovoltaic fabrication testing technician,
- Energy retrofitting specialist,
- Waste composting,
- Green landscaping,
- Whole home performance analysts,
- Hybrid car maintenance,
- Industrial ecologist,
- Recycling, reclamation technicians.

Federal Requirements of Programs of Study

Programs of Study (POS) must include coherent and rigorous content aligned with challenging academic standards and relevant career and technical content. This content must be delivered in a coordinated, non-duplicative progression of courses that align secondary and postsecondary education, and lead to an industry-recognized credential or certificate at the postsecondary level or an associate or baccalaureate degree. In addition, the programs may include the opportunity for secondary education students to participate in dual or concurrent enrollment programs or other ways to acquire postsecondary education credits.

References


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