A CONCEPTUAL FRAMEWORK FOR GREEN CAREER AND TECHNICAL EDUCATION: SUSTAINABILITY AND THE DEVELOPMENT OF A GREEN-COLLAR WORKFORCE

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ABSTRACT

Background/Context: *In this paper sustainability is explored as an emerging paradigm for career and technical education (CTE). The current context of the sustainability or green movement is discussed and CTE is compared to environmental education. A sustainability literacy conceptual framework is then applied to career and technical education.* ***Purpose/Focus of Study:*** *An argument is presented that CTE programs should green their curriculum and instruction to meet the needs of students, employers, business/industry and the environment. It is then argued that a sustainability literacy conceptual framework is needed to assess current efforts by CTE programs to green their curriculum and instruction, shape and inform future efforts and to assess sustainability efforts in CTE.* ***Research Design:*** *This paper is an analytic essay in which the historical, philosophical, and theoretical foundations of CTE are reviewed and then related to environmental education. Sustainability is defined, examined and applied through a sustainability literacy conceptual framework to CTE.* ***Conclusion:*** *Green CTE represents a new paradigm for the field and sustainability is a complex not yet well understood concept. This paper is intended to stimulate conversation about the purpose(s) of CTE as well as the possible role CTE has in contributing to sustainability through local actions.*

Key words: *career and technical education, sustainability, education for sustainable development, environmental education.*

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INTRODUCTION

In the past few years the popular press (e.g., National Geographic, 2009; Time, 2007; U.S. News & World Report, 2009) and scientific reports (e.g., Intergovernmental Panel on Climate Change, 2007; United Nations Education, Scientific, and Cultural Organization, 2004; World Wildlife Fund for Nature, 2005) have been reporting that humankind is quite likely reaching the tipping point where the rate of global warming cannot be slowed by human effort, that the melting of glaciers is impacting oceans and coastlines, that the loss of species, habitats, topsoil and shifting weather patterns are contributing to droughts and the desertification of previously fertile lands. Given the magnitude of these reports, and the empirical evidence presented in them, it is hard to dismiss the United Nation's claim that nearly two thirds of the natural systems that provide services for humans are in distress, on the verge of collapse, or past the point of retrieval (United Nations Statistics Division, 2005).

While the above literature is troubling, an increasing number of scholars (Edwards, 2005; Orr, 2002, 2004), government and political leaders (Gore, 1992; Obama, 2008), popular culture spokespersons (Greenhouse, 2008; Salkin, 2008) and organizations/associations (BuildingGreen, Cradle2Cradle, GreenBlue), have claimed that a sustainability revolution has emerged or is emerging to address climate change or global warming. Further, there is considerable evidence that while the green collar or environmental workforce may be difficult to define, it is poised for major growth (Greenhouse, 2008; Jones, 2008).

Given the increased frequency of *Career Tech Updates* that report sustainability initiatives in career and technical education across the nation, the April special issue on sustainability and green CTE in *Techniques*, and the Association of Career and Technical Education (ACTE) Issue Brief, *CTE's Role in Energy and Environmental Sustainability*, it is evident that CTE is increasingly focusing on sustainability or becoming *green* to assist our country with its major energy, economic, employment and environmental challenges. Further, not only are some USA career and technical educators involved in sustainability, but it is also noteworthy that the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and the International Centre for Technical and Vocational Education and Training passed Resolution 57/254, which proclaimed ten years (from 2005 to 2014) as the United Nations Decade of Education for Sustainable Development (UNESCO, 2004).

PURPOSE AND OBJECTIVES

The purpose for writing this analytical essay is to argue that CTE has a critical role in sustainability education. The objectives for writing this paper are to: (a) provide support for the position that CTE can meet the needs and serve the interests of learners, communities, our nation and planet by infusing sustainability in its curriculum and instruction; and (b) advocate for a conceptual framework to shape, inform and assess curricular and instructional sustainability efforts in CTE.

RESEARCHER AS INSTRUMENT

In qualitative, theoretical and conceptual research, the researcher becomes the primary instrument for both generating data and establishing its meaning (Bettis & Gregson, 2001). Part of these traditions is to be transparent about one's beliefs and experiences that may have influenced data collection, analysis, and findings (Gregson, 1998). As such, I share the following to assist the reader in determining issues related to transference and trustworthiness.

Beginning in the early 1970s, I developed an interest in alternative construction (e.g., solar, recycled building materials, gravity flow water systems, earthen), sustainable agriculture (e.g., organic gardening, holistic ranch management), and appropriate technology (e.g., composting toilets, water conservation and reclamation, solar fruit dryer). This interest became a passion, and I began specializing in solar construction as a carpenter/contractor. When I entered the field of education as a construction technology instructor at a secondary technical high school and at a technical/community college, I became a certified solar panel builder and chaired a taskforce for the State of Arkansas for infusing green building in the construction technology curriculum. This paper then represents an opportunity for me to capitalize on my experiences, expertise, and interests as well as learn more about the possible role of career and technical education in relationship to sustainability.

CONCEPTUAL FRAMEWORK

Rojewski (2002) posited that a conceptual framework is helpful for (a) analyzing the complex and sometimes contradictory landscape of career and technical education, (b) considering program evaluation and curricular revisions, and (c) revisiting the purpose(s) of career and technical education. To adhere to Rojewski's observations on the characteristics of a desired conceptual framework and in an attempt to build support for the conceptual framework presented in this paper, the following dimensions are briefly addressed: (a) the historical socio-economic-political context of vocational education and/or career and technical education, (b) the transformation of philosophy into practice, (c) CTE compared to environmental education, (d) green CTE, and (d) sustainability literacy as applied to CTE.

Historical Socio-Economic-Political Context

Vocational education, or career and technical education as it is now called in the United States, has a long legacy of striving to address social problems.1 When one reviews legislation designed to focus vocational education to address a given problem, it is apparent that vocational education has been funded in the past to: (a) prepare workers to meet business/industry workforce demands for the industrial era (Smith-Hughes Act of 1917), (b) contribute to national defense during the cold war (National Defense Act of 1958) (c) assist special needs populations in attaining the knowledge, skills and dispositions needed to be successful in life and work (Vocational Act of 1963), (c) help students learn applied academic skills that are imbedded in particular occupations and are needed for success in both higher education and the world of work (Carl D. Perkins Vocational and Applied

Technology Act of 1990), and (d) provide training and/or education to veterans (George-Barden Act of 1946) (Gordon, 2008).

While the extent to which CTE has been effective in addressing social problems is arguable (e.g., Copa & Tebbenhoff, 1990; Kincheloe, 1995, 1999), there seems to be evidence through legislative acts and articulated philosophical positions that CTE is believed by some to at least be a tool for partial solutions to complex socio-economic problems (Dewey, 1916; Gordon, 2008; Gregson, 1996).

From Philosophy to Practice

While a federal legislative timeline provides evidence that funding and legislative mandates have attempted to make CTE responsive to national problems and relevant to the respective social context, philosophical and theoretical positions have also been articulated and debated which have posited that CTE should be at least shaped and informed by the social context in which it is situated.2 For example, the rancorous debate that raged in the late 1800s over the purpose and substance of vocational education has been revisited many times and from many differing perspectives (e.g., Gregson, 1996; Kincheloe, 1995, 1999; Wirth, 1980). This debate has been characterized as a conflict between two different philosophical views about the relationship between education and work, embedded in a larger framework of assumptions about the role of schools serving society (Simon, Dippo, & Schenke, 1991). The instrumental view, espoused by David Snedden and Charles Prosser, was that vocational education should train selected students to meet the needs of business and industry. In contrast the pedagogic view, espoused by John Dewey (1916), was that education through occupations could help all students experience learning that is active, experiential, meaningful, relevant and pragmatic in nature (Simon, Dippo, & Schenke, 1991).

However consider Kincheloe's (1995, 1999) postmodern position that it might be possible for CTE to reflect both the instrumental and pedagogic view simultaneously. In this instance then CTE might be a pedagogic tool in the Deweyan sense in that it provides students with a real world context for applying Science, Technology, Engineering and Mathematics (STEM) to address a particular environmental problem (e.g., building a house that reflects Leadership for Environmental and Energy Design {LEED} principles) while also preparing students to assume green-collar jobs {e.g., carpenter who does green construction} reflective of instrumentalism.

Vocational and Environmental Education: Common Roots, Common Ground?

Similar to career and technical education, environmental education (EE) has been informed and shaped by differing and sometimes competing philosophies as well as by shifting social contexts. Just as some have argued that vocational education emerged in part as a response to a perceived crisis due to problems associated with industrialization, urbanization, and immigration (Wirth, 1983), some have argued that environmental education emerged as largely a response to an impending ecological crisis (Orr, 2004). Though differing definitions of environmental education have different ramifications for curriculum and instruction, it is evident that Dewey's pragmatism has informed most if not all of the

traditions of EE. Consider that environmental education theorists have stated that: (a) students should gain a sense of agency that they can make changes and help solve problems (Hungerford & Volk, 1991), (b) a pragmatic view of the world should be embraced because the universe is in a constant state of process and flux (i.e., continually changing), (c) phenomena can be understood and problems solved by applying the scientific method, (d) the most powerful environment for learning is often outside the classroom or school, (e) learning occurs through a two-way interaction between the student and the curriculum, teacher as a facilitator, and a peer group, (f) the curriculum should be focused on problem-solving skills, learning strategies, cooperative learning and social skills / self-esteem building, and (g) learning should be local in nature (e.g., local stream or lake) even though it may promote global thinking (e.g., water pollution) so students find relevance and make-meaning (Bradley, 2007).

While the above lists of theoretical positions suggest a unified conceptualization of environmental education, the conceptual and theoretical differences in EE are perhaps as variant and passionately debated as they have been/are for CTE. For example in some schools, environmental education has become a subject, a discrete set of knowledge and skills to be studied and acquired. It is used as a tool to help students develop the skills and values they will need to secure productive jobs and participate in a competitive marketplace. Recently EE has also been used as a justification for its ability to raise students' scores in science on standardized tests (Gruenwald, 2003).

However, just as there are dissenting voices who continue to critique the dominant conception of career and technical education (Gregson, 1996; Kincheloe, 1995, 1999), there are also dissenting voices who continue to critique the dominant conception of environmental education. Consider the following quote from Sobel when he defined *place-based* pedagogy as

> *the process of using the local community and environment as a starting point to teach concepts in language arts, mathematics, social studies, science, and other subjects across the curriculum. Emphasizing hands-on, real-world learning experiences, this approach to education increases academic achievement, helps students develop stronger ties to the community, enhances students' appreciation for the natural world, and creates a heightened commitment to serving as active, contributing citizens. Community vitality and environmental quality are improved through active engagement of local citizens, community organizations, and environmental resources in the life of the school (2004, p.7).*

While the language of place-based pedagogy may be unfamiliar to many career and technical educators, the extensive use of local advisory committees as well as the frequent employment of community-based learning projects by CTE professionals certainly makes its curriculum and instruction place-based in some respects.

Although the term place-based education is a fairly new designation in educational literature, principles of using place in education have been part of alternative philosophies of education for the last 100 years (Woodhouse & Knapp, 2000), drawing from experiential education,

outdoor education, problem-based learning, constructivism, critical pedagogy, and indigenous people's traditions (Gruenwald, 2003). Because the concept of place-based education has different origins, it also has varying nuanced meanings. For example, Simon Ortiz, a notable Acoma Indian poet, writer and storyteller stated that "Native America people base their lives on…three interrelated things: land, culture and community (Villani, 1992, p. 32). Hence, place informed Native Americans' understandings of plants as medicine and food, animals, as well as their spiritual and cultural connections to a local environment or place (Deloria & Wildcat, 2001). The notion of place-based education then can help sensitize CTE professionals to issues related to appropriateness (e.g., economic, cultural). Place-based career and technical education then not only is congruent with one or more trends related to sustainability such as green design (e.g., use of local materials) and the organic food movement (e.g., local/fresh foods), but it is also informed and shaped by the sub-culture of a given place. Consider the following quote from a Pueblo elder:

> *There's new and advanced technology out there—computers, and this and that. You have to go have yourself a good education. It is very important. You have to have a good job. You know, my grandpa would tell us to go to school. But he always says, "Don't you ever go and lose your Indian way" (Peshkin, 1997, p.92).*

Though indigenous studies focus on the needs and interests of native peoples, critical pedagogy focuses on social class and gender as well as race and ethnicity (Kincheloe, 1995) As Gregson (1994a, 1994b) and Lakes (1994) helped introduce a critical pedagogy philosophy into the vocational education literature, Orr (1992) brought a critical pedagogy philosophy to environmental education. He defined a philosophy of environmental education saying that "[a]all education is environmental education" (p. 49). Orr then challenged the dominant paradigm to rethink the purpose of education. More than preparing workers for the workforce, he argued that education should prepare people to live and work to sustain the cultural and ecological integrity of the places they inhabit.

Green Career and Technical Education

When one reviews the customized news briefings, *Career Tech Update* from the Association of Career and Technical Education to its members, and the special issue of Techniques on sustainable or green CTE, there seems to be no question that career and technical education programs are once again adapting to meet the needs and serve the interests of students, employers, communities, and our country whether it be a new program or an existing program that greens its curriculum. Consider the following examples:

> **1. CTE School Developing "Green Energy" Apprentice Program**
> New Jersey's Today's Sunbeam (12/18, Carpenter) reported, "*Starting next school year, students at the Salem County Career and Technical High School will have the opportunity to become 'green energy' apprentices.*" The Salem County Vocational Technical School District (SCVTS) recently announced *"a $310,000 grant spread over two years from the New Jersey Department of Labor and Workforce Development."*

2. Colorado Students Build Electric-Generating Wind Turbines
The Grand Junction (CO) Free Press (12/3, Vader) reported on students at Central High School, who built "*electric-generating wind turbines*" as part of a technology education class. "*First, using the Internet, the class researched generators and sketched their own designs, including the shape of the blades.*" Then, "*using mattboard, each student made their turbines,*" building "*the power block, the motor mount, the housing and the gears.*" Afterwards, the students hooked their creations "*up to a computer, put the turbine in front of a fan, and then measured the electricity and the vibration generated by low, medium, and high fan speeds.*" The students followed technology educator Ed Reed's "*protocol: Research it, design it, build it, and test it.*" The article notes, "*Their lessons are a small application of the STEM, or Science, Technology, Engineering, and Math emphasis in education, to make America's students and future workers more competitive in a world market.*"

Jones (2008) stated *"The green"* in *"green-collar"* is about preserving and enhancing environmental quality—literally saving the Earth. Green-collar jobs are in the growing industries that are helping us kick the oil habit, curb greenhouse-gas emissions, eliminate toxins, and protect natural systems" (p. 13). Both the "Green Energy" apprenticeship program and the Colorado technology education class building electric-generating wind turbines reported in Career Tech Updates seem like they contribute indirectly if not directly to the notion of a green-collar workforce. In addition, it appears that green CTE is growing (pun intended) at an increasingly rapid rate. Consider the following reports:

Green Job Training Increasing in Popularity

The AP (4/14, Chea) reports, "*As the economy sheds jobs, community colleges across the country are reporting a surge of unemployed workers enrolling in courses that offer training for 'green-collar' jobs,*" and teach students "*how to install solar panels, repair wind turbines, produce biofuels and do other work related to renewable energy.*" In order "*to meet growing demand, two-year colleges are launching or expanding green job training with money from the federal stimulus package,*" and many, such as North Carolina's Central Carolina Community College, are reporting "*long waiting lists for green building and renewable energy classes.*"

The *Worcester (MA) Telegram & Gazette (4/13, Welsh)* noted that "*green careers are becoming increasingly attractive to number crunchers. That's because green innovations, driven in the past by environmental activism, are now being fueled by tax incentives, rebates and high-paying salaries.*" Although many schools are developing specific green-collar programs, experts note that "*green careers don't have to be so specialized,*" since there are "*jobs on the 'gray-green' spectrum,*" such *as "electricians and pipe fitters, who can transfer their skills from other industries to new green technologies.*" Meanwhile, "*civil and environmental engineering majors...develop sustainable designs in all aspects of engineering activities, including selection of material and energy resources, building design, construction methods and environmental control technologies.*"

GREEN-COLLAR WORK, SUSTAINABILITY, AND SUSTAINABLE DEVELOPMENT

However, unlike many environmentalists and educators who have recently embraced sustainability, Jones (2008) and Hawkin (2007) have also argued that green-collar work should be about fighting poverty as well as pollution—that economic and social injustice are integrally related to environmental exploitation and degradation. Hence green-collar workforce development is also about providing good wages, equal opportunities, pathways to success, and job creation (i.e., eliminating "dead-ends" in education through articulation agreements). The Obama administration deemed green-collar workforce development an important dimension of the 2009 Recovery and Reinvestment Act *(http://www.nsf.gov/recovery/)* and embraced Jones' definition of it.

Jones (2008), Harkin (2007) and the Obama administration's (2009) perspective on green-collar work is congruent with the World Commission on Environment and Development, or Brundtland Report's (1987) widely accepted definition of sustainability: "To meet the needs of the present without compromising the ability of future generations to meet their own needs." Sustainability then, in a broad sense, is the ability to maintain a certain process or state. It is now most frequently used in connection with biological and human systems. For humans to live sustainably, the Earth's resources must be used at a rate at which they can be replenished. However, most scientists now agree that humanity is living unsustainably and that an unprecedented collective effort is needed to return human use of natural resources to within sustainable limits.

The Brundtland Report has been recognized as transformational because it helped shape the central ideas now associated with sustainability: intergenerational equity, and the interrelatedness of environment, economy, and social justice. However, perhaps of even greater relevance to CTE is the Bruntland Commission's articulation of the concept sustainable development. Though some critics have recognized the notion of sustainable development as an oxymoron because development requires growth and sustainability requires stopping or at least lessoning growth (Nolet, 2009), others believe the concept of sustainable development can bridge the gap between environmentalists and those concerned with business/industry, workforce and economic interests (Arenas, 2005, 2008). Hence, sustainable development makes intuitive sense for CTE because CTE prepares the people who grow (e.g., sustainable agriculture), build (e.g., green construction), install (e.g., solar panels, wind turbines), repair (e.g., hybrid cars), and create (e.g., organic or local fresh cuisine) which contribute to development efforts (Arenas, 2005, 2008; Dippo, 1998; Gregson, 2008).

SUSTAINABILITY LITERACY

Nolet (2009) credited Orr (1992) for first conceptualizing sustainability literacy through the notion of ecological literacy. Orr's notion of technological sustainability is particularly relevant to CTE because it refers to specific practices that are embraced in many CTE programs such as use of materials, manufacturing, forestry, and agriculture. Further technological sustainability falls within Nolet's definition of sustainability literacy: *"the*

ability and disposition to engage in thinking, problem solving, decision making, and actions associated with achieving sustainability" (p. 6). Orr (2004) has also made explicit the link between the problem of education and the problem of sustainability. Specifically Orr stated, *"This is not an argument against education but rather an argument for the kind of education that prepares people for lives and livelihoods suited to a planet with a biosphere that operates by the laws of ecology and thermodynamics"* (p. 27).

While it is evident from Nolet's (2009) and Orr's (1992, 2004) writings that they draw upon Dewey's philosophy for education, the United Nations Decade of Education for Sustainable Development (UNDESD) document also reflects Dewey's pragmatism with an emphasis on experiential learning, the moral and social context of schooling, and that learning be situated in the larger socio-economic context (Nolet, 2009). Specifically the document specified that education for sustainable development should aim to:

1) be interdisciplinary and holistic.
2) be values driven (be explicit so that values and norms can be examined, debated, tested and applied).
3) promote critical thinking and problem solving.
4) facilitate co-learning, co meaning-making.
5) incorporate participatory decision making.
6) be locally relevant (i.e., globally minded but locally focused and applied).

Given the need for and current efforts of greening career and technical education to promote sustainability, given the need to clarify the highly complex and contextual nature of sustainability, given the need to assess the progress and efforts of CTE in promoting sustainability, and given the need to help ensure CTE's role in the sustainability revolution and the green-collar economy, a conceptual framework is needed to assess current efforts as well as shape and inform future efforts. Nolet (2009) examined the sustainability education literature and proposed a sustainability literacy conceptual framework. Based largely on Edwards' (2006) analysis of documents from 39 environmental organizations, as well as the works of several others (e.g., Bell & Morse, 2006; Orr 2004; Sobel, 2005; UNESCO, 2005) that produced seven themes, Nolet added two additional themes and then validated the framework through multiple sources of evidence, and submitted this framework to selected groups of Washington state educators for consideration. This framework was ultimately embraced by the state of Washington as a guide for facilitating sustainability literacy which is now required by the state. Gregson (in process) developed and administered a national survey based on the nine themes within Nolet's sustainability literacy framework to learn of ACTE members practices with respect to sustainability. To validate the nine themes that shaped and informed the survey, Gregson (a) used a panel of experts, some of whom had expertise in CTE and others who had expertise in survey research, to revise the survey as they deemed needed, (b) pilot tested the survey using 72 CTE professionals from an Inland Pacific Northwest state, (c) had a graduate class comprised of adult education, human resource development and CTE professionals studying action research review the survey for content and language, and (d) incorporated suggested revisions to promote greater clarity and trustworthiness.

A Sustainability Literacy Conceptual Framework as Applied to Career and Technical Education

The following is a list of the nine themes Nolet (2009) put forward as a conceptual framework for sustainability literacy. The text that follows the themes was added in an effort to describe possible implications the themes have for career and technical education.

Stewardship suggests caring about and caring for, the environment. CTE does and can play such a critical role in stewardship. While the possibilities are endless, some of the more apparent ones include: (a) sustainable agriculture, (b) green construction, (c) preparing sustainable energy technicians, and (d) preparing culinary arts professionals who focus on local/fresh or organic cuisine.

Respect for limits calls for preventing waste, pollution, and unsustainable resource depletion. Because many CTE programs probably operate on scarce resources, minimizing waste may often be common place in CTE programs but this theme may also raise awareness of our carbon footprint, water consumption and chemical use that is an integral part of some CTE programs.

Systems thinking and interdependence addresses not only the ecological relationship among species and nature but also the links among economic and social systems. For example, CTE programs address transportation and communication systems, food and energy production, and manufacturing, all of which have technical, economic, and social implications for environmental impact.

Economic restructuring is a part of the growing awareness that expansion of employment opportunities must not preclude safeguarding ecosystems. It is not necessarily *anti-capitalism*; however, it does distinguish between *good capitalism* and *bad capitalism* (Bamol, Litan, & Schramm, 2007) in that it supports the green-collar economy for environmental reasons as well as for *good work* (e.g., meaningful work, sustainable wages, benefits).

Social justice and fair distribution have only recently been emphasized in the sustainability movement. These now seems to be an understandings that the consumption and distribution of resources, and the pollution and exploitation that results from them, disproportionately impacts those who are economically disadvantaged (Harkin, 2007; Jones, 2008). Because CTE students may often disproportionately represent those from the working class and the economically disadvantaged (Gordon, 2007; Gray & Herr, 1998; Kincheloe, 1999), it is important that students are informed of potential earnings as well as related pathways to further education related to the green-collar economy.

An *intergenerational perspective* suggests that decision-making about critical choices facing society must be guided by a long-term rather than short-term view. As stated on the packaging of *Seventh Generation* products, "In our every deliberation, we must consider the impact of our decisions on the next seven generations" (From the Great Law of the Iroquois Confederacy). As Nolet (2009) observed, the idea of intergenerational responsibility has

particular relevance for teachers and teacher educators whose work is already directly concerned with intergenerational responsibility.

Nature as model and teacher implies that humans can learn much if they pay attention to the Earth's living systems. For example, agriculture and natural resource professionals are now recognizing the value of native plants. While admittedly a discourse on what constitutes *native* exists, it makes some intuitive sense to select plants that thrive naturally in a given environment rather than plants that need an exorbitant amount of water or chemical additives just to survive. This theme also recognizes the value of indigenous and eastern knowledge as it is often more mindful of ecological sensitivity (Harkin, 2007; Roberts, 2009). For example, while solar energy is now being promoted in the USA as a way for energy conservation and to promote renewable energy usage, it is noteworthy that southwestern tribes used passive solar energy in their cliff dwellings centuries ago (Duran, 2007; Snyder, 1974).

Global citizenship relates to the interactive and interdependent nature of global political, economic, social and ecological systems. Scientific advances have helped us to understand how actions in one country may result in reactions in another country—not only those bordering but across the world. In addition the global economy has internationalized CTE curriculum as students learn to provide services, manufacture, build, grow and repair as part of the global economy. Being a global citizen means having an international perspective which values differing cultures, ideology, and religions.

*Importance of local p*lace has been and should continue to be a part of CTE. While some CTE programs utilize national *off-the-shelf* curriculum because of its adherence to industrial and professional standards, CTE programs usually employ local advisory committees to be certain that the curriculum is contextualized for the program's local place. However, as important as the notion of *local place* applies to sustainability, it is critical that students gain an understanding of how local/fresh foods are more sustainable that the dominant industrial model food system (Pollan, 2006) and how 'green construction' is not only about energy efficiency but rather is also about using local and renewable materials where feasible (Duran, 2007).

CONCLUSION

In this paper sustainability was considered as an emerging paradigm for career and technical education. An argument was presented that a conceptual framework was needed to guide the development of CTE for sustainability and dimensions for considering a conceptual framework were addressed. Specifically the following dimensions for considering and using the proposed conceptual framework were discussed: (a) historical socio-economic-political context, (b) the transformation of philosophy into practice, (c) CTE compared to environmental education, (d) green CTE, (e) sustainability literacy, and (f) sustainability literacy themes as applied to CTE.

Warmbrod (1986) and more recently Johnson and Camp (2005) seemed to imply that a conceptual framework is synonymous with a theoretical framework. While the sustainable literacy framework presented in this paper possesses a theoretical richness when viewed

through theoretical lenses such as critical theory and constructivism, it is beyond the scope of this paper to theorize about the relationship of this framework to such theories. Further, because the sustainability literacy conceptual framework is currently being used in two studies as a tool for collecting and making sense of empirical data, it is anticipated these efforts will contribute to theory development and theory testing. Nonetheless, as Martinez (2007) suggested, CTE scholar-practitioners should also give thought as to how values-based principles should inform practice. For example, sustainability related concepts such as stewardship and conservation of resources are practices informed by values-based principles and should be considered.

Examples were provided in this paper of how sustainability has been or can be infused into CTE. However, the program areas referenced have not been comprehensive or illustrative of the many possibilities in CTE. Sustainable agriculture, green construction, and alternative energy related programs may be the most obvious examples; however, sustainability has dimensions related to business and marketing education, family consumer sciences and many other programs as well.

In the opening of this paper it was suggested that we are now facing challenges that are global in nature and magnitude, and that our thinking, practices and educational systems are flawed. Einstein stated: "The significant problems we face cannot be solved at the same level of thinking we were at when we created them" (as quoted by Covey, 2004, p. 19). I look forward to trying to engage in multiple levels of thinking with you about how we as CTE scholar-practitioners can promote sustainability for our students, communities, and planet.

Endnotes

[1] *The terms vocational education and career and technical education are used interchangeably. However, references to historic events or thought use "vocational education" in an attempt to preserve the integrity and intent of past authors' work.*
[2] *The terms philosophy and theory are acknowledged as slippery. For example, Elias and Merriam (1995) label critical theory as radical philosophy while scholars such as Kincheloe (1995, 1999) and Simon, Dippo, and Schenke (1991) use philosophy and theory to describe what they conceptualize as critical work education.*

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