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## Connecting Vocational and Technical Education With Sustainability

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### Introduction

Vocational and Technical Education (VTE), also known as career and technical education, productive education, work education, or technology education, is the form of education most directly tied to the world of work because it provides students with the knowledge and skills to become economically productive members of society. VTE has generally been perceived as a less prestigious form of education relative to general, academic education, in great part because it was created to serve youth from lower socioeconomic backgrounds and because the pecuniary and status rewards derived from it have been, especially in developing countries, lower than those for graduates of the academic strand. In terms of the role it has played in industrial societies, VTE has sought to train students to produce goods and services that maximize economic growth while yielding individual benefits (as measured by salary earnings and occupational opportunities) and societal ones (as measured by GDP and other macro-economic indicators). The conventional discourse and policies surrounding VTE have focused mostly on increasing personal and social rates of return and seldom have they sought to present a critical analysis of the social relations inside VTE programs—related to power differences around sociological categories such as class, ethnicity, gender, physical ability, or sexual orientation—and much less on the social or environmental consequences of the production of the targeted goods and services (Anderson, 2009; Arenas, 2008; Kincheloe, 1995).

In the last two decades, however, a VTE counter-discourse has arisen that focuses on the intersection among economic, social, and environmental sustainability. Some of the main concepts behind each of these three partially overlapping dimensions are as follows (UNESCO & UNEVOC, 2004):

1. *Economic Sustainability*: This dimension promotes economic literacy (how to ensure that a business

remains alive over the long term) in tandem with sustainable production (how to provide goods and services that address basic human needs and offers a better quality of life while being accountable for social and environmental costs of these goods and services) and sustainable consumption. This latter theme is especially true for the developed world, which has only 20 percent of the world's population but consumes 75 percent of the world's energy and 80 percent of its resources, while generating 75 percent of its pollution.

2. *Social Sustainability*: This dimension advocates, first and foremost, poverty alleviation, with an emphasis on access to basic needs such as clean water, air, and soil; decent housing; universal health care; and dignified work. It also calls for respect for cultural diversity, gender equality, and inclusion of groups that have been historically marginalized. And finally, it pushes for fair and safe working conditions inside the workplace.
3. *Environmental Sustainability*: This dimension calls for the conservation of natural resources, and for a use that minimizes waste and pollution by engaging in life-cycle analysis of all products and services. At the same time it stresses a new set of attitudes, skills, and values that cultivate a respect for the earth in all its diversity, and a sense of care for the earth's community in a way that secures its bounty and beauty for present and future generations.

In addition to analyzing the shift from conventional VTE toward VTE for sustainability, this chapter examines how it is currently enacted in secondary schools. It ends with the presentation of several areas that need further exploration to advance the cause of VTE in the context of sustainability. These areas (i.e., curriculum development; teacher education; facilities, equipment, and maintenance; and assessment strategies) harbor the reforms that need to occur in academic institutions at the secondary level to ensure a fundamental altering of purposes, structures, and roles.

### Debates About VTE and the Rise of a New Discourse

VTE started to gain traction worldwide in the 1960s, thanks to national and international education policies that emphasized the development of human capital to increase economic productivity in both rural and urban areas (Heyneman, 1986). It was assumed that through VTE youth and adults would acquire a new set of skills and attitudes toward work (and modernity in general) that could help impoverished societies attain a higher standard of living. International organizations and ministries of education and labor became engaged in labor forecasting that would help mold VTE programs in accordance with the economic needs of the country five, ten, or fifteen years down the road. But as soon as implementation of these policies started, several publications emerged criticizing the alleged benefits of VTE (e.g., Blaug, 1973; Foster, 1963). Essentially, these studies pointed out that VTE did not confer the pedagogical, social, or economic benefits that national education planners were promising: Students' attitudes toward manual work did not improve; teachers often used manual work as a form of punishment; students, parents, and teachers perceived the vocational track as inferior to the academic one; VTE did not halt the migration to urban areas or prevent vocational education graduates from pursuing a university degree; and it did not alleviate unemployment or increase the salaries of vocational graduates. Moreover, it was concluded that needs for human power could not be forecasted with any degree of certainty; in fact, VTE programs based on the employment predictions put forth by planning agencies ended up yielding widely inaccurate results because graduates from these programs were pursuing either a higher status university degree or a different line of work altogether (Heyneman, 2003).

Research on VTE continued in the 1980s and 1990s with a focus on cross-country analyses of the social rates of return of VTE (World Bank, 1991, 1995). These studies compared VTE and general academic education in terms of internal efficiency (i.e., the costs of both tracks), and of external efficiency (i.e., the amount of time needed to find employment after graduation and the graduates' earning patterns). They concluded that VTE, although it cost at least twice as much, delivered lower economic benefits in comparison to general academic education. The low rates of return for VTE led organizations such as the World Bank to conclude that it should be pushed out of secondary schools and moved into postsecondary institutions and the workplace (World Bank, 1995). Indeed, as a result of these studies, international funding for VTE was slashed and many programs were discontinued, despite the fact that other studies contradicted the low rates of return attributed to VTE (e.g., Bennell & Segerstrom, 1998). More recent research on the role of VTE in specific countries (e.g., India: World Bank, 2008; new EU members: Canning, Godfrey, & Holzer-Zelazewska, 2007) or globally (World Bank, 2007) have supported the premise that the social rates of return on VTE are too low to warrant its continuance as an independent curriculum strand in secondary schooling.

A collective analysis of these various studies reveals that the bulk of the research and discourse on VTE has concentrated on how to increase the employment prospects and lifetime earnings of individual graduates and, simultaneously, to improve the economic productivity of the society as a whole. These *raison d'être* of VTE have been inscribed directly into a development paradigm that supports industrialization, rationality, homogenization, and growth economics, while paying scant attention to developing local economies that reaffirm local culture and foster self-sufficient communities that protect the environment (Anderson, 2009). To be fair, the impetus behind vocational education has always been to reduce poverty, but the strategies have been mostly focused on introducing students to what Damon Anderson (2009, p. 36) called "productivism"; that is, a geopolitical space in which "economic growth and [labor] are [viewed as] permanent and necessary features of human existence, regardless of their adverse impact and consequences, social, cultural and environmental." In general, the practice of VTE and its mainstream discourse have had little regard for how they can address issues of social and economic justice, and far less for how they can improve ecological integrity. Productivism has been a key rationale behind VTE since its inception, and has been and continues to be vital in its reproduction.

Countering productivism, a new discourse in VTE has emerged that strongly advocates a form of development that fosters a responsible economic system that is highly responsive to social and environmental issues, what Anderson (2009) called "ecologism." This trend became particularly evident starting in 1999 with the UNESCO-sponsored Second International Congress on Technical and Vocational Education, held in Seoul, and the subsequent establishment in 2000 of the UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training in Bonn. The Final Report of the 1999 Congress made explicit statements regarding the relationship of VTE to social and environmental stewardship (UNESCO, 1999, p. 1, 27):

The VTE of the future must not only prepare individuals for employment in the information society, but also make them responsible citizens who give due consideration to preserving the integrity of their environment and welfare of others. An integral component of life-long learning, [VTE] has a crucial role to play in this new era as an effective tool to realize the objectives of a culture of peace, environmentally sound sustainable development, social cohesion and international citizenship.

Other international organizations have issued statements that echo this new orientation, as demonstrated by these joint recommendations from UNESCO and ILO on the purposes of VTE (2002, p. 9):

1. Contribute to the achievement of the societal goals of greater democratization and social, cultural, and economic development;

2. Lead to an understanding of the scientific and technological aspects of contemporary civilization . . . while taking a critical view of social, political, and environmental implications of scientific and technological change;
3. Empower people to contribute to environmentally sound, sustainable development through their occupations and other areas of their lives.

Implicit in these statements is the rise of a new philosophy surrounding the notion of development. This new social and environmental discourse surrounding VTE was captured by Rupert Maclean, UNESCO-UNEVOC's founding director, when he wrote (2005, p. 270),

All countries want development, since this implies improvement; and they also want development that is long-term, and therefore sustainable. But communities increasingly want development that not only stresses economic matters but which also pays greater attention to important social, cultural, political and environmental considerations. Increasingly, countries are not willing to accept economic development at any cost and expect the benefits of development to reach all sections of the community.

This new discourse, based in a human-in-nature focus, has several common themes across sociocultural, environmental, and economic strands (Fien & Wilson, 2005). From a sociocultural perspective, it includes human rights, peace, gender equality, cultural diversity, health, and democracy. From an environmental perspective, it addresses natural resource conservation, climate change, urban and rural sustainable development, and disaster prevention and mitigation. And from an economic perspective, it involves poverty reduction, corporate responsibility and accountability, a critique of unregulated market economies, and sustainable production and consumption.

One reform common to both forms of discourse is a push for a comprehensive curriculum that combines academic and vocational education. Advocates of both forms of discourse realize the importance of having all students, regardless of their socioeconomic background, engage in VTE as a means of providing relevance, context, and concreteness to academic learning. The convergence of academic and vocational education has the potential to challenge the individualistic nature of today's schooling and to give students the opportunity to learn collectively for a reward other than a grade. Many schools worldwide have come to recognize that curricular convergence is worth considering, as a 2005 World Bank report concluded:

Curriculum-based reform of secondary education in the twenty-first century is prioritizing skills and competencies that go beyond and cut across the traditional general-vocational divide. The frontier between general and vocational curricula is shifting and fading, and the heretofore hard-to-strike balance between vocational and general education is becoming increasingly irrelevant (p. xxi).

### The Challenges of Translating Discourse Into Policy

As explained in the previous section, two radically different approaches to the discourse and research surrounding VTE have developed: productivism and ecologism (Anderson, 2009). How these discourses and research become translated into actual policy is a question with an evolving answer. In general terms it is fair to say that the productivist discourse has had more influence and overall appeal to national-level policymakers, whereas ecologism's influence has been more manifested at the local level, and even then, its presence has depended on the idiosyncrasies of specific sites and educators. In a case study looking at the national level, Heila Lotz-Sisitka and Lausanne Olvitt (2009) analyzed the influence, or lack thereof, of a sustainability agenda in South Africa's National Qualifications Framework (NQF). The NQF is a set of national educational and work standards based on quality, equity, and redress, agreed to by education and human resource development experts throughout South Africa. The NQF, jointly administered by the Ministries of Education and Labor, is meant to be inspired by the post apartheid 1996 South African Constitution which enshrined the right to a healthy environment for all citizens and the sustainable use of natural resources. However, according to Lotz-Sisitka and Olvitt (2009, pp. 320), the NQF failed to live up to its sustainability expectations: "The NQF was not creating adequate opportunities for environmental and sustainability learning, as few qualifications were being designed. The qualifications design was being driven mainly by industry's immediate needs for skills development, rather than the requirements of the new national policy guiding sustainable development."

The researchers attributed this lack of success to two main problems: (1) the NQF failed to include a set of generic standards that addressed education for sustainable development; and (2) the Ministry of Labor, which is in charge of developing, funding, and implementing vocational programs, has been more concerned with the provision of skills and competencies to increase economic output and employability than with the other two legs of the sustainability stool. To address these issues, Lotz-Sisitka and Olvitt (2009, pp. 325–326) advocate for a concerted dialog between the Ministries of Education and Labor to create a new vision and set of tools to assist groups at the national and municipal level to implement lessons related to sustainability. Such dialog could encompass the following six categories: (1) environmental; (2) management/planning and administrative; (3) legislative; (4) communications; (5) social justice and ethics; and (6) monitoring, evaluation, and research.

South Africa is not alone in grappling with the predicament of translating idealist-sounding documents into national educational standards, particularly at the local site level. Canada, Germany, Australia, India, and Azerbaijan are among a long list of other countries that are traversing a similar quagmire (Fien, Maclean, & Park,

2009), and just as in South Africa's case, research in some of these countries has yielded a set of generic indicators focused on sustainable development that could be transferred to VTE and the workforce (e.g., for Canada, see Chinien, Boutin, McDonald, & Searcy, 2004). How well sets of generic indicators, or even occupational-specific ones, can be translated into actual practice remains to be seen. What is clear, however, is that many manifestations of VTE related to sustainability can be found at the local level but not in the national sphere. That is the topic we turn to in the next section.

### Expressions of VTE and of Sustainability

Although it has become fashionable to talk about "environmental jobs" (Renner, 2000) or "employment for sustainability" (Edwards, 2005), the truth is that all forms of employment, regardless how "green" they purport to be, include expressions that could be considered unsustainable. Such is the intrinsic condition of living in a modern society. For example, a person installing a wind turbine is considered to have an environmentally friendly job, yet a wind turbine consists of more than 8,000 parts, everything from screws to generators to blades, parts that tend to be manufactured under less-than-sustainable conditions. Or consider the receptionist working at a solar panel manufacturer who is paid a miserly wage or the solar panel distributor who discriminates against employees of a minority background. Clearly, many jobs wear many hats, and although the push should be toward truly sustainable employment that simultaneously addresses the needs of people, nature, and the economy, a dogmatic opposition to industrialism or to livelihoods that fall short of green or sustainable ideals would be counterproductive (Lehmann, 2008).

VTE, the form of education most directly connected to employment, faces a similar predicament. Take agricultural education, for instance. The best-case scenario for VTE would be to teach organic farming and all that it implies—using minimal tillage, crop rotation, green manure, compost, and biological pest controls—but the reality is that many agricultural VTE schools in rural areas teach conventional methods of farming that use synthetic pesticides and fertilizers, plant growth regulators, and even genetically modified organisms. Nonetheless, even in such schools, students are learning skills and values related to social and environmental sustainability, including the importance of manual labor, of working in nature, of producing a basic need, and of becoming self-reliant. Thus, the reality of the day-to-day practices of VTE carries within it a combination of sustainable and unsustainable practices.

Having said this, VTE practitioners and researchers would do well to adopt a set of sustainability principles that can guide the creation of new VTE programs that address social and environmental costs. Such sets of principles already exist, four of which are the Ontario Round Table on Environment and Economy Model Principles (to assist local communities to define their sustainable development

goals); the Natural Step (created by Karl-Henrik Robert and others in Sweden, and based on systems principles); the Principles of Ecological Design (by John and Nancy Todd, which provides a biological framework that places nature at the center of the design process); and the Earth Charter (completed in 2000 and highlighting basic values of sustainability such as respect for life, protection of the environment, social justice, and democracy; for a review of these and other sets of sustainability principles, see Edwards, 2005).

Attempts to operationalize these principles in the context of VTE at the local level can be found in the work of Anderson (2009), Arenas (2001–2003, 2008), and UNESCO (1999). Some examples of principles include (Arenas, 2001–2003, p. 82),

In terms of social responsibility, VTE programs should:

- Ensure an equal concern for imparting adequate skills alongside a critical analysis of the social and political history of vocational education.
- Promote horizontality and ample dialog in the decision-making process regarding the process and purpose of production.
- Ensure that the product or service addresses a social or environmental need. Do not create a product that intentionally harms humans or the environment, such as bombs; or that has a built-in obsolescence; or that uses resources obtained by exploiting the labor of others.
- Ensure that students are exposed to alternative forms of economic production (e.g., worker-owned businesses; cooperatives).

In terms of environmental responsibility, VTE programs should:

- Establish meaningful and productive relationships with firms that engage in "green" practices.
- Assess the needs of the locality first, instead of establishing standardized vocational models with prepackaged answers for a whole country or state.
- Strive for usage of local, native, and organically grown resources.
- Emphasize products that are durable, repairable, refurbishable, and that make use of renewable energy and/or that are energy efficient.
- Push for product life-cycle analysis at school to help unveil hidden externalities.

Expressions of these principles in secondary schools can be found in the following examples (e.g., Arenas, 2008; Delisio, 2000; Schreuders, Salmon, & Stewardson, 2007; Soledi, Sorial, McNerney, & Husting, 2007; Wolf, 2001):

- Green construction, including integrated design systems, low-impact and energy-efficient materials, rainwater harvesting, and compost toilets.

- Organic and integrated farming and animal husbandry, organic urban gardens, and native-plant landscaping.
- Environmental engineering, including the prevention of water, air, and soil pollution and restoration of polluted areas.
- Repairing automobiles and home appliances, such as old computers.
- Furniture-making with sustainably harvested materials.
- Creating and rehabilitating urban and rural parks.
- Rescuing noncommodified and ancestral knowledge and skills, such as those of indigenous groups, related to healing, construction, food, clothing, recreation, and other basic needs.
- Providing services to needy populations, such as the elderly and the homeless.
- Tapping onto alternative and low-impact energy sources, such as solar, wind, and biodiesel.

The actual manifestation of these types of education will vary from school to school in terms of who benefits from the vocational program (do all students take the courses or only those in a vocational track?); the school's organization (is the school organized around vocational clusters or limited to a vocational course that students take, or is it an after-school or summer program?); or the school's curriculum (is there a vocational track per se or is it part of the regular academic courses, or is it considered part of service-learning or community service?). These differences are less important than the fact that students have the opportunity to provide a product or service that benefits the community as a whole and the environment.

### Areas for Further Exploration

**Curriculum Development** Since the late 1980s, several scholars have singled out VTE as being silent at the social level about patterns of exploitation and discrimination in terms of the population it serves and the outcome of its programs (Kincheloe, 1995; Shor, 1988; Simon, Dippo, & Schenke, 1991). These researchers have argued that VTE has historically paid scant attention to societal pathologies that reproduce an unequal distribution of wealth; racist, sexist, and homophobic practices in the workplace; and dull and degrading forms of work. As Kincheloe (1995, p. 25) observed, VTE programs have been far more concerned with teaching job skills, leadership strategies, public relations, and program evaluation than with the socioeconomic realities of industrial practice and the nature of dignified work.

These criticisms have been coupled with those put forth in the 1990s by researchers who observed the lack of connection between VTE and the conservation of natural resources and biodiversity protection (UNESCO & UNEVOC, 2004). They analyzed how VTE was following in the footsteps of an industrial economy that showed little regard for environmental integrity, and they proposed that

the outcome of the productive process (the effects on the environment as a result of the extraction, manufacturing, distribution, and delivery of goods and services) was just as important as the process of production itself.

Despite these critiques, national, or regional curricula that integrate VTE studies with principles of social justice and environmental integrity are hard to come by. To be fair, many curricular units related to sustainable development have been created, but only a few of these have been translated into the field of VTE (Pavlova, 2009). Nonetheless, three key strategies for curriculum development that would counteract these trends and history are (1) the application of sustainability principles in all courses, vocational and nonvocational alike; (2) identify specific curricular implications for occupationally relevant areas; and (3) whenever possible, match students with employers to ensure students receive actual work experience (UNESCO & UNEVOC, 2004, p. 23).

A related issue is the creation of curricular units related to noncommodified and low-status knowledge and skills that can help communities to become more self-reliant for many basic needs. Thus, if a particular vocational program that focused on culinary arts wished to gain sustainability credentials it would behoove it to offer meals that employ not only local, organic, and fair-trade produce, but also produce that is native to the area and is in danger of becoming extinct. This would ensure that heritage crops and localized forms of preparation remain alive and ultimately keep intergenerational networks of support vibrant (Bowers, 2001). One example of rescuing noncommodified knowledge is found in the work of Arenas (2003), who studied secondary schools in Colombia that have created curriculum around productive education. In one case, sixth grade students established an ethnobotanical garden and learned the various cultural uses of the plants; several times of year, students would go out into the community to sell specimens of the plants and teach the local population about the various uses of each plant. The ethnobotanical garden has become a centerpiece for teachers of various subjects who have created a truly cross-disciplinary curriculum. For other examples working with youth inside and outside schools, see Hautecoeur (2002).

**Teacher Education** Just as with curriculum development, the field linking teacher education, VTE, and sustainability is quite incipient. Given the novelty of the field and the ongoing emergence and re-emergence of new and old forms of knowledge that lower humans' ecological impact, it becomes imperative to transform teacher education from a paradigm that views the teacher as the expert who imparts knowledge to a paradigm wherein the teacher is knowledgeable but learns alongside the student. Probably the person who has conducted most research in this field is Margarita Pavlova, who has studied the sustainability attitudes and knowledge of technology education teachers in western and eastern European countries and Australia. She concluded (Pavlova, 2009, p. 87),

Most preservice teachers and practicing teachers . . . were not familiar with what sustainable development or ESD [education for sustainable development] means. The exceptions were teachers who were personally engaged in activities relevant to sustainable development outside their work, or those who had studied environmental sciences at university.

On a hopeful note, Pavlova found that teachers did express interest in being able to incorporate sustainability lessons into their daily work but would require extensive professional development in order to do so (2009, p. 106). Clearly then, both preservice and in-service education are indispensable for successful integration of sustainability in teacher education. During preservice preparation teachers-to-be would acquire the concepts and methodologies to reformulate old patterns related to VTE, whereas in-service education would allow previously trained VTE teachers to learn a whole new set of concepts and practices to integrate sustainability into their daily work. What are some of the practices that technology education teachers could be exposed to (Pavlova, 2009, p. 118)?

- They could learn to extend the life of household products by repairing, reusing, refurbishing, or remanufacturing them.
- They could learn how to make goods that are more energy-efficient.
- They could learn to harness renewable resources.
- They could help in the rebirth of traditional crafts as a way of supporting social and cultural revitalization.

Clearly, none of these topics is easily to develop. Current teachers were not exposed to them while in preparation, and colleges of education preparing future teachers are currently not equipped to do the job adequately (or at all). The task becomes even more daunting with the last topic, the rebirth of traditional crafts. Not only were most teachers not exposed to these practices when growing up, but they were also trained to master and admire high-status knowledge and to ignore or despise low-status one, which ultimately is the basis of community life for many poor communities around the world (Bowers, 2001, p. 155). Two strategies will become crucial: First, exposing students to the effectiveness and the beauty of many of these noncommodified practices to ensure adequate buy-in from preservice and in-service teachers; and second, stepping outside the field of technique and entering into the field of moral philosophy to attune students to the importance of such values as humility and appreciation for alternative epistemologies that offer a different set of answers than those provided by positivist science and methodology.

**Facilities, Equipment, and Maintenance** Conventional VTE has been eliminated from many schools because of its higher cost per student relative to general academic education. The problem of expense is compounded further when

one adds sustainability considerations, given that new materials and tools would be needed for such activities as manufacturing photovoltaic panels, installing rainwater harvesting systems, or repairing hybrid vehicles. Government programs that pay for the costs of procurement could offset some of the initial costs, but once the purchases are made, ongoing funding would still be needed for maintaining equipment and upgrading or replacing obsolete equipment.

For strictly vocational programs, establishing an apprenticeship model involving internships at appropriate companies may allow schools to save on some expenses, but such a strategy would not work for comprehensive schools that want to expose all students to technical and vocational skills. For such schools a continued financial commitment to the VTE component would be indispensable to ensure its permanence as a viable program.

One example of how effective teacher education can be implemented at both the preservice and in-service levels as long as adequate materials and facilities are available is seen in a module entitled “Product Design (Plastics)” (Pavlova, 2009, p. 112). This thirteen-week module asks preservice or in-service teachers to make a board game for children. They are expected to design and manufacture the board game, including the packaging, applying concepts of sustainability. The materials used in the production of the board game need to be made from reused materials or have a high recycled content. The actual design and manufacturing of the board game is accompanied by a series of lectures on plastics for a sustainable future, recycling, life-cycle analysis, design and manufacturing techniques, and safety issues. To ensure a successful course, adequate facilities and proper tools are indispensable. Unique courses like this one will need to be implemented to ensure that VTE and sustainability go hand in hand.

**Assessment Strategies** In the context of sustainability, quantitative and qualitative assessment methods using indicators are becoming the most commonly applied strategies. Indicators seek to measure an aspect of sustainability that shows a trend over time and space. For an indicator to be useful, data need to be available, reliable, and valid; collected on a regular basis; meaningful to the various interested groups; and easy to communicate to the community at large. Most currently available sets of indicators have been developed (or are in the process of being developed) at the national and international levels, including in the UK, Germany, Scandinavian countries, the Asia-Pacific region, and the UNECE region (fifty-five countries from Europe and North America) (for a review of these indicators, see Tilbury & Janousek, 2006). The following are the main types of indicators (Sollart, n.d.):

- *Baseline indicators*, which identify starting points and help to ascertain realistic impact indicators. Examples of questions are: What are current levels of understanding and support for sustainability? What are the

opportunities for promoting it? What are factors that will act as obstacles against it?

- *Outcome indicators*, which enable researchers to ascertain anticipated and unanticipated learning results. Examples of questions are: What are learners able to understand and do as a result of the change? In what ways have learners' values and attitudes changed?
- *Performance indicators*, which show whether plans were carried out and how effectively. Examples of questions are: Do the learning methodologies communicate the issues and facilitate the learning process? Do practitioners share good practice and positive working relationships?
- *Impact indicators*, which assess progress toward goals, including long-term impacts on practice at different levels, such as changes in classroom practice, learning methodologies, and schemes of work and curriculum contents, all the way to national-level impacts such as change in accreditation systems and education policies. Examples of questions are: Have there been changes in curriculum content or methodologies? Have there been changes in institutional policy and practice?

Initial research on these sets of indicators has revealed several trends worthy of consideration (Tilbury & Janousek, 2006): First, users have focused mostly on restating the main components related to sustainability and to some extent have identified areas of progress, but very little has been done to build on such progress. Second, indicators are being adopted wholesale with little involvement on the part of intended beneficiaries. This has prevented them from being flexible enough to accommodate local needs and from developing a common language that is accessible to all. Third, whereas both quantitative and qualitative indicators are being used, researchers have found out that quantitative indicators have been less useful than qualitative ones in measuring sustainability. The reason for this is that quantitative forms of measurement have been more concerned with hitting performance targets than with the social processes that produce sustainability in the first place, which ultimately are more difficult to measure. And fourth, there has been a tendency to focus on single indicators when in fact there should be a push toward using multiple ones that capture the complexity of sustainability—as long as the greater number is still manageable and realistic.

## Conclusions

The emergence of a new discourse related to VTE has been a long time in the making. With a greater presence of environmental concerns in both the popular media and in policy-making circles, an increasing number of academic and vocational educators are becoming attuned to the importance of imbuing their programs with a concern for protecting the natural environment. However, translating such a discourse into effective and comprehensive educational policies is a task that remains elusive. To ensure a

greater effectiveness in enacting new policies and to do justice to the complexity of connecting sustainability to VTE, several issues are worth highlighting: First, in an effort to “green” VTE programs, there is a danger of displacing or not giving equal import to social and cultural concerns. Becoming “green” has become fashionable in contemporary society, and firms, big and small, have jumped on the environmental bandwagon. It is easy to fall into the belief that the solution to environmental problems is simply a matter of improved technologies and better pricing systems. Although these strategies are often part of the solution, just as important is the need to address issues of oppression and injustice inside schools and places of work. Thus, it is imperative that educators do not lose sight of the importance of working on both environmental and social concerns simultaneously.

Second, academic educators sensitive to sustainability issues are becoming increasingly aware of the importance of joining forces with vocational educators. They are realizing that it is no longer enough simply to talk about the importance of organic farming if the student (or the teacher) does not know how to farm organically. This issue calls for new curriculum development and teacher education (both pre and in-service) that imparts new knowledge and skills to all teachers and includes a permanent dialog among teachers to create cross-disciplinary and experiential learning. It also requires the constant support of school administrators and of new educational policies that allow for a more flexible school schedule and a performance-based system for grading students.

Third, in times of financial shortfalls VTE programs are often among those that suffer the most. Many shut down entirely, or the equipment they rely on is not replaced or repaired when needed. Creating the conditions described here, especially in terms of the convergence of academic and vocational education, will require added financial expenditures by schools, and a cost-benefit analysis of the personal and social rates of return of VTE should not focus narrowly on expenditures per student or student earning potential post graduation. Equally important are such considerations as revitalizing local economies, protecting natural resources, reclaiming traditions rich in cultural heritage, and enabling individuals to be more self-sufficient, all of which may bring forth much greater individual and collective economic well-being in the long run.

And fourth, educators must be aware that this new form of VTE clashes head-on with industrial economies that are characterized by incessant material growth that is undifferentiated and unqualified. As Schumacher wrote, in the context of modern economies it has become nefarious to consider “the idea that there could be pathological growth, unhealthy growth, disruptive or destructive growth” (1989/1973, p. 51). In rejecting this notion, educators must be steadfast in the belief that the goal of VTE should be to maximize human satisfaction through the optimal amount (not the maximum possible amount) of production

and consumption. The opposite of growth should not be non growth, but rather sufficient growth, less material growth with regard to wants but more with regard to basic needs (including services such as health, housing, mass transportation, clean water, and so on). In essence, there needs to be a recognition that the new approach to VTE redefines the current concept of well-being, from one that stresses material accumulation to one of a development of solidarity in a harmonious relationship with nature.

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