
Rethinking Education for Sustainable Development: Interdisciplinarity, Community and Environmental Justice

P. Kolenick

Abstract

As a perspective on education for sustainable development at universities, the purpose of this Chapter is to explore a reconceptualization of education for sustainable development through Stephen Sterling's conceptions of education as an agent of change, and alternatively, as a subject of change. This study is a personal point of view that is speculative and limited to sustainability programs and curricula at Canadian universities with implications for the role of education for sustainable development within the realm of the prospective contribution of the social sciences to the study and practice of sustainability.

Keywords

Education for sustainable development (ESD) · Sustainability transition · Higher education · Interdisciplinary education · Community engaged learning · Social justice · Environmental justice · Regional centres of expertise (RCE)

P. Kolenick (✉)

Faculty of Education, University of Regina, 3737 Wascana Parkway,
Regina, SK S4S 0A2, Canada
e-mail: paul.kolenick@sasktel.net

1 Introduction

In this Chapter the potential of Education for Sustainable Development—a term popularized over the past several decades by agencies such as the United Nations Educational, Scientific and Cultural Organization (UNESCO)—will be considered as a significant part of the prospective contribution of the social sciences at universities, as institutions of higher education, toward the transition to the sustainable campus of the twenty-first century. As a perspective on education for sustainable development at universities, the purpose of this Chapter is essentially to “rethink” education for sustainable development, within the realm of the social sciences and their potential contribution to the sustainable campus, through Stephen Sterling’s (2003) argument that the common perception of education as an “agent” of change that has been maintained over several decades must shift paradigmatically to the notion of education itself as a “subject” of change if indeed a transition toward the sustainable campus is to take place. The nature of this study is one of a personal point of view that is speculative and limited to sustainability programs and curricula at Canadian universities with implications, however, for universities worldwide.

This shift in thinking about the very nature of education in the field of sustainability is linked and associated closely with the orientation of this particular volume, with its aim on social science theory, models, and findings through a diversity of perspectives and research conducted worldwide. One may draw, however, upon a wide range of literature in the field of the social sciences and sustainability in higher education, which includes, for example: the state of the sustainability movement in universities and society at large (Tovey 2009); preparation of prospective university graduates on issues of sustainability (Roberts 2013; Sibbel 2009; Thomas and Day 2014); development of interdisciplinary sustainability curricula and the integration of sustainability in teaching, research and the operational practice at higher education institutions, (Barth 2013; O’Rafferty et al. 2014; Stubbs and Schapper 2011); professional development in sustainability of academics at universities (Holdsworth et al. 2008); roles of faculty and staff in achieving campus sustainability (Brinkhurst et al. 2011); perceptions of students and faculty of sustainability as part of an interdisciplinary framework (Mobley et al. 2014); the potential of transformative learning (Singleton 2015); and, systems thinking in curricula to foster learning in sustainability (Habron et al. 2012). In each, if not all, of these areas of study, an educative process is conceivably taking place. As such, the broader aim of this Chapter is to explore the potential contribution of education for sustainable development, or sustainability education, within the realm of the social sciences in the transition toward the sustainable campus.

Over a decade ago, Becker and Jahn (1999) compiled a collection of cross-disciplinary perspectives of the social sciences on sustainability—similar to the work compiled in this volume. In his contribution, Michael Redclift shared an observation of how sustainability as a concept has been informed by the natural sciences as manifested, for example, by the Intergovernmental Panel on Climate Change (IPCC) with its emphasis on “good science” that is rigorous, reliable, and

objective, and further, “timeless and placeless, in some sense independent of human intervention, waiting, as it were, to be discovered” (Redclift 1999, p. 268); the natural sciences are, however, viewed in contrast to the social sciences which are “pluralist in conception” and not “‘timeless’ or ‘placeless,’ but closely identified with particular times and places” (Redclift 1999, p. 268). More recent scholarship has looked to the theoretical development and practice of sustainability in higher education. Jones et al. (2010), for example, consider the interdisciplinary study of sustainability, international trends, as well as sustainability from a variety of disciplines and professions including: geography, business studies, nursing, law, the fine arts, theology, social work, and teacher education among others; further recent volumes include Johnston’s (2013) *Higher Education for Sustainability: Cases, Challenges, and Opportunities from Across the Curriculum*, and notably, Barth’s (2015) *Implementing Sustainability in Higher Education*, which raises issues of the role of Higher Education in Education for Sustainable Development with a focus on the important question of how universities can equip learners with the skills and capabilities necessary to make significant contributions to a truly sustainable future. In addition, however, Barth asks a more fundamental question of how curricula itself needs to change in order to facilitate transitions toward the sustainable campus—a question considered in this Chapter.

2 Sustainable Development at Universities: Three Positions

The prospective contribution of the social sciences to sustainable development, and particularly education for sustainable development, can be found through the interdisciplinary programs and community engagement among Canadian universities, for example, in light of recent initiatives such as the United Nations University Regional Centres of Expertise (RCE) on Education for Sustainable Development as part of the Decade of Education for Sustainable Development (DESD), 2005–2014 (UNU-IAS 2013a). As a unique contribution of the social sciences to sustainable development at universities, education for sustainable development (ESD) has a prospective role in furthering global transitions toward the goal of sustainable living for future generations, with immediate implications for issues of the natural environment, yet also for issues of social and environmental justice, such as poverty, the marginalization of women, and North/South inequalities. This role, however, dates back, following the Brundtland Report (WCED 1987), to Agenda 21 (Chap. 36) of the Rio Declaration on Environment and Development (1992), which called for the promotion of education, public awareness and training, as critical “for improving the capacity of the people to address environment and development issues” (UNSD 1992)—a milestone declaration accompanied by a series of international declarations and charters, relevant especially for the promotion of sustainable development at universities, such as the Talloires Declaration (1990), the Copernicus Charter (1994), and the Ubuntu Declaration (2002) (IISD 1996; UNU-IAS 2013b).

Looking toward the future, universities as institutions of higher education have a potential leadership role to play in moving humanity from a position of business as usual based on high consumerism, and the continuing depletion of natural resources, to a transition of living sustainably within planetary limits (Sterling and Maxey 2013b, p. 304). The concept of a sustainability transition is characterized as long-term and multi-dimensional, involving “fundamental transformation processes through which established socio-technical systems shift to more sustainable modes of production and consumption,” noted historically through “socio-technical” transitions, for example, of pipe-based water supply, or the shift from carriages to automobiles (Markard et al. 2012, p. 956). In light of the warning among scientists worldwide of the impending geographical, social and economic effects of climate change this century (IPCC 2014), arguably a global transition in energy supply needs to take place from a worldwide dependence on fossil fuels (e.g., coal, oil, natural gas) to the advancement of alternative sources of energy, such as wind and solar power. The potential contribution of universities toward the advancement of a societal and global sustainability transition will be considered in this Chapter, particularly through interdisciplinary and community-engaged curricula with implications for issues of social and environmental justice.

2.1 Sustainability Programs at Canadian Universities

There are at least five identifiable aspects of universities that may be considered as part of the contribution that can be made toward the transition to sustainability within societal and global contexts. These aspects include initiatives undertaken in the areas of governance, operations, research, curricula, and community engagement. The Rio+20 Declaration of 2012 for Higher Education notes several prospective commitments, such as the operational “greening” of campus facilities including, for example, the adoption of sustainable procurement practices, sustainable mobility options for students and faculty, programmes for waste minimization, recycling and reuse, as well as curricula that integrates sustainable development concepts, and the direction of research on issues of sustainability through a sharing of scientific and technological knowledge (UNCSD 2011). Significantly, these initiatives are reflected in the study of sustainable development and sustainability in higher education, which has also drawn attention to aspects of the governance, or formal administration, of sustainability programs (e.g., campus greening, energy efficiency, recycling), research focused on topics of sustainability (e.g., climate change, water management), as well as the development of integrated or interdisciplinary curricula, and engagement with communities for the design of sustainable programs and practices (Vaughter et al. 2013, p. 2253).

An informal, limited and non-exhaustive review of sustainable development, or sustainability, programs among Canadian universities through the Association of Universities and Colleges of Canada (AUCC 2014) reveals a commitment generally to “greening” programs for facilities and operations (e.g., energy efficiency, waste

management, transportation), and other aspects included with less frequency, such as governance, for example, as well as the development of interdisciplinary curricula, collaborative research programs, and opportunities for engagement with communities. The governance of sustainability programs is undertaken through administrative bodies, such as the Office of Sustainability at the University of Alberta, which is organized by a three-tiered program of planning across facilities and operations, teaching and research, as well as engagement with faculty, students, and communities (University of Alberta 2014a). In addition to the administrative offices responsible for sustainability programs and research on campus, Canadian universities rely upon policies and strategies to mark out their responsibilities, such as the Sustainability Academic Strategy at the University of British Columbia, which is defined in part through its responsibility to explore various facets of sustainability through research and curricula across disciplines and fields of study in the humanities, social sciences, natural and applied science, and the medical and health fields (University of British Columbia 2014b). Among the other aspects of sustainability, however, the development of interdisciplinary curricula is particularly illustrative of the work underway at Canadian universities, even though there exist wide variations from degree programs with courses that touch upon concepts of sustainable development, or sustainability, to entire faculties or colleges with programs devoted especially to the study of sustainability as it applies integratively to a wide range of disciplines and professional practices (Table 1).

Regardless of the curricula in place, however, the impact of various programs in sustainable development, or sustainability, at universities is determined arguably to a considerable degree by the mindset, thinking, or positioning of those programs. Three positions—status quo, reform, and transformative—may be applied toward an understanding of the place of education for sustainable development within the context of the university as an institution of higher education (Hopwood et al. 2005), combined with Gregory Bateson's (1972) three orders of learning and change (as cited in Sterling 2003, 2011).

2.2 The Status-Quo and Reform Positions

Supporters of the status quo (or conformist) position recognize the need for change but see neither the environment nor society as facing insurmountable problems. Sustainability, as a goal, may be attained relatively easily through increased information and awareness, combined with an unquestioned deference to improved management techniques and technologies (Hopwood et al. 2005, p. 13). Educationally, this position is reflective of an adaptive or “bolt-on” response where, for example, new modules or courses may be added, or campus greening is carried out without fundamental change to the strategies, operations and programs of universities (Sterling 2003, p. 282). In terms of learning, the status quo position is perhaps on par, and a good match with Bateson's first-order level of learning and change. First-order learning is essentially about doing more of the same; that is, “change

Table 1 Sample sustainability curricula descriptions at Canadian universities

University	Sample description
Dalhousie University	College of Sustainability—first and second year components of the ESS (Environment, Sustainability And Society) program are integrated, multidisciplinary and team-taught by faculty members across all seven Dalhousie faculties (http://www.dal.ca/faculty/sustainability.html)
Simon Fraser University	Faculty of Environment—an interdisciplinary program offering a range of issues including aboriginal and archaeological origins of society, human and physical geography, environmental management and resources issues, business and sustainability, and more (http://www.sfu.ca/fenv.html)
University of Alberta	A range of options for studying and researching sustainability is offered through degree programs (e.g., Environmental Studies, Forest Business Management, Resource Economics and Environmental Sociology) (http://www.sustainability.ualberta.ca/en/EducationResearch.aspx)
University of British Columbia	Sustainability courses either concentrate on the concept of sustainability, including its environmental, social and economic dimensions, or incorporate one or more aspects of sustainability as a distinct course component, unit, module, challenge or activity (http://sustain.ubc.ca/courses-teaching/degree-programs)
University of Calgary	Undergraduate and graduate degree programs are offered with sustainability-focused (core) courses focusing on the concept of sustainability, and sustainability-related courses incorporating sustainability as a distinct course component or module, that may concentrate on a single sustainability principle or issue (http://www.ucalgary.ca/sustainability/courses)
University of Saskatchewan	School of Environment and Sustainability—interdisciplinary, problem-oriented and experience-based graduate and undergraduate learning for issues of environment and sustainability, with research focused on sustainable ecosystems, sustainable communities, and water security (http://www.usask.ca/sens/)
University of Victoria	Sustainability is incorporated into curriculum and experiential learning to train tomorrow's leaders to address complex interdisciplinary challenges of sustainability and climate change (http://www.uvic.ca/sustainability/education/index.php)
University of Waterloo	The School of Environment, Enterprise and Development—focused on the intersection of environment and sustainability with business and development (https://uwaterloo.ca/environment/)
Western University	The Centre for Environment and Sustainability—an interdisciplinary initiative supported by the Faculty of Science (host faculty), Faculty of Engineering and Faculty of Social Science, and other contributing faculties (http://www.uwo.ca/enviro/)
York University	Faculty of Environmental Studies—directed toward interdisciplinary, analytical, and collaborative research, education and action on critical and changing environmental issues (http://fes.yorku.ca/)

within particular boundaries and without examining or changing the assumptions or values that inform what you are doing or thinking” (Sterling 2011, p. 22). This type of learning is concerned primarily with information transfer, or learning about things, occurring in “likely subjects” like biology or geography in various faculties and departments across university campuses. Consequently, this approach to learning and change tends not to challenge the beliefs or assumptions of the learner (Sterling 2013, p. 35); that is, “higher education is not primarily engaged in the provision of deep learning to students, but in first-order learning: the transmission of information and the development of instrumental skills aligned (increasingly) to the perceived needs of the economy” (Sterling 2004, p. 51). Notably, the status quo position is distinguished as having a minimal effect on universities, as well as on the values and thinking of faculty members and students, in which the “take-up” of sustainability concepts is piecemeal and largely disconnected. As Sterling (2003, p. 285) concedes, however, while a long way from leading faculties and students to sustainable living, it is “better than nothing,” and can open the doors of universities to more fundamental change.

The reform position offers a “building-in” or an integration of sustainability concepts and practices, where existing assumptions may begin to be questioned with the potential for meaningful changes in policy and curricula. Like the status quo position, the focus is on technology, good science and the dissemination of information, and is dominated by academics and mainstream non-governmental organizations (Hopwood et al. 2005, p. 17). This position is unique in that it is directed toward “learning for change” with the explicit understanding that “the necessary values, knowledge and skills are known and can be taught” (Sterling 2003, p. 285). Reform is essentially the *modus operandi* of education for sustainable development, which looks to sustainable development in its relation to disciplines within a university setting as not “added to an overcrowded curriculum, but a gateway to a different view of curriculum, of pedagogy, of organisational change, of policy and particularly of ethos” (Sterling 2004, p. 50). In terms of Bateson’s levels of learning and change, the reform position corresponds to his second-order learning, which is deemed as “more challenging and involves the learner (or learning organization) critically examining, and if necessary changing, his/her/its beliefs, values and assumptions” (Sterling 2011, p. 23). While first-order learning and change is directed toward “doing things better” (i.e., with more efficiency and effectiveness), second-order learning is more concerned with “doing better things”—that is, this mode of learning raises questions about purposes and values. Efficiency and effectiveness—yes, but to what end? (2011, p. 23).

Through the reform position and its correlate of second-order learning, the notion of interdisciplinary learning in particular has potential as a way for the social sciences to contribute to sustainable development at universities. Notably, the interdisciplinary approach to curricula lends itself well to problem-based inquiry, which requires multiple perspectives, “as no one discipline will suffice to capture social, cultural, regulatory, technological, scientific, economic and ecological dimensions of lived experience” (Stefanovic 2008, p. 423). Whether it is through, for example, multidisciplinary (i.e., investigating educational phenomena from

multiple disciplines), cross-disciplinarity (i.e., an extension of one discipline into the area of another, as in business ethics), or perhaps transdisciplinarity (i.e., an application of perspectives across disciplines that transcends the disciplinary organization), an interdisciplinary approach to curricula, in general, places at premium the importance of demonstrating to students that issues of sustainability require “broad consultations,” and further, a firm grounding in problem-based approaches to inquiry of social and environmental issues (Esbjörn-Hargens 2010, p. 73; Stefanovic 2008, p. 424). Taken from an interdisciplinary, or integral, point of view, education and learning are unmistakably multidimensional as “we need to include the insights and truths from a myriad of perspectives as they all have something to offer a more complete understanding of any topic or phenomena” (Esbjörn-Hargens et al. 2010, p. 5). If universities are to play a role in the leadership toward transitions of sustainability in the twenty-first century, then they “need to find ways to facilitate interdisciplinary efforts that draw on the strengths of many different disciplines, allowing them to combine and integrate their knowledge around specific sustainability challenges” (Matson 2009, p. 41). A few universities in Canada (see Table 1, above), for example, have developed interdisciplinary programs in the form of schools or colleges directed toward problem solving, as well as institutions set up with the purpose of housing multiple disciplines for the study of sustainable development. These endeavours provide opportunities not only for the bringing together of various disciplines, but also the emergence of an envisioned approach to sustainable development, as indicated in the Copernicus Guidelines for Sustainable Development (2005) for the development of interdisciplinary curricula (and research). This vision, however, is reinforced by the promotion of networking (i.e., promoting interdisciplinary networks of environmental experts at the local, national, regional and international levels, with the aim of collaborating on projects both curricula and research), and further, partnerships (i.e., partnering with communities, government, non-governmental organizations, and others to develop coordinated approaches, strategies and actions) (UNECE 2005).

At Dalhousie University, for example, an interdisciplinary approach is taken while delivered collaboratively by members of various faculties across the campus, including agriculture, agriculture and planning, arts and science, arts and social sciences, computer science, engineering, health professions, management, medicine, and science. Significantly, this view of curricula offers a space for “students to understand the complex real world of sustainability problems from a variety of perspectives and conceptual frameworks” (Dalhousie University 2014), in contrast to the traditional approach to education at universities, which “fragments and sectoralizes information so that one discipline has no understanding of its impact on the other” (Wright 2010, p. 203); that is, “a student graduating with a business degree from the university might understand the financial benefits of oil extraction, but not the full environmental, political, and social ramifications and costs (and vice versa for a student in political science or biology)” (2010, p. 203). In this manner, the interdisciplinary approach to curricula for sustainability education carries the potential toward an understanding of complex and worldly problems related to issues of societal and global sustainability. To its credit, interdisciplinary study

offers up a “transcendence” over individual disciplines that “embraces and extends the ideas of others until the boundaries between ‘mine,’ ‘his’ and ‘hers’ dissolve” (Carson 2007, as cited in Stefanovic 2008, p. 424). In this sense, interdisciplinary education for sustainability takes on an enlarged perspective for bringing scholars and students together in “real world” problem solving.

This perspective can be enhanced potentially through the relationships of universities with outlying communities. Western University, for example, offers a community-learning program designed to engage students, staff, and faculty in “meaningful experiential learning opportunities” that help to meet the needs of communities while promoting a sense of civic engagement, empathy, and social responsibility among students (Western University 2015). Similarly, the community-engaged learning program at the University of British Columbia places students in community settings, such as non-profit organizations or inner city schools, as a required part of academic courses, or as voluntary co-curricular placements (University of British Columbia 2014a). The community-service learning program at the University of Alberta likewise encourages students to “contribute in real ways to community organizations and gain valuable experience at the same time” by incorporating service-learning into academic coursework linked to issues and problems of sustainability (University of Alberta 2014b). Community-engaged, or community-service, learning programs present an opportunity for universities, as institutions of higher education, to venture beyond their normal confines toward a more integrated and community-engaged practice, reminiscent of the African expression, “*ubuntu*”—meaning, “I am what I am because of who we are” as an “acknowledgement of the significance of community and human interconnectedness” (Thiele 2013, p. 140).

In 2005, the United Nations University announced Regional Centres of Expertise on Education for Sustainable Development as a contribution to the UN Decade on Education for Sustainable Development (2005–2014). Taken within the realm of community-engaged programs of study, the Regional Centres of Expertise offer a space for universities to engage with outlying communities in addressing problems of immediate concern, described in this context as “a meeting point, a clearing-house, a knowledge broker, and a platform for information exchange and sharing” (Mochizuki and Fadeema 2008, p. 376). The regional focus of the Regional Centres of Expertise is perhaps where they can be potentially the most effective in bringing universities together, at a faculty level, with the interests, concerns, and problems of outlying communities. In this way, RCEs can play a “central role in developing an integrated regional approach to ESD, bringing the best of knowledge from the natural sciences, social sciences and humanities and integrating this knowledge with the best of educational practices of their community and regional partners” (2008, p. 378). Regional Centres of Expertise lend themselves well within universities, as institutions of higher education, as a means of “bridging the gap” between communities, governmental departments, businesses, and other organizations and stakeholders (Keen et al. 2005, in Sedlacek 2013, p. 75), or as van Ginkel observes, “RCEs... create a natural framework for helping higher education institutions to break out of their normal confinement and play a positive, meaningful

role in society” (as cited in Glasser 2008, p. 115). Yet questions can be raised with respect to the inclusivity of Regional Centres of Expertise as offering spaces or platforms within a university setting for dialogue and collaboration on issues of sustainable development that is truly in the spirit of “broad consultations” as suggested from an interdisciplinary, and moreover, a community-engaged point of view.

2.3 Regional Centres of Expertise, Environmental Justice, and the Transformative Position

In considering the prospect of Regional Centres of Expertise as venues of education for sustainable development, Stefanovic (2008, p. 420) refers to recent research that raised concerns of “the lack of integration of ESD with issues of environmental justice.” In a survey of a Regional Centre of Expertise located in the city of Toronto, Canada, for example, it was found that issues such as “poverty alleviation” and “peace studies” were not identified by any of the responding organizations as a primary area of focus; in fact, over 80 per cent responded that these concepts were “not a focus” at all (2008, p. 420). In his pioneering work, Bullard (1993) offers this definition of environmental justice as “any policy, practice, or directive that intentionally or unintentionally differentially impacts or disadvantages individuals, groups, or communities based on race or color; as well as exclusionary and restrictive practices that limit participation by people of color in decision-making boards, commissions, and staffs” (as cited in Bowen and Wells 2002, p. 689). In this way, environmentalism is defined and valued in broader terms beyond the preservation of uninhabited wilderness as inclusive of a place where people live, work, play and worship—hence, environmental justice takes into its purview people and their place in the environment, including urban environments. The consideration of issues of justice within the realm of environmentalism requires that the environment be viewed not simply as green spaces and conservation, but more broadly as a place that comprises everyday, social experiences. As Stein (2002, pp. 1–2) observes, “This more inclusive view of human/nature interaction brings environmental issues *home*, so to speak, and makes it clear that environmental injustice includes a range of urban and rural issues that expose poor communities and communities of color to unfair risks and burdens” [italics in original] with attention, for example, to the clear-cutting of forests, the dumping of industrial wastes, water rights and quality, as well as hazardous work (and underemployment), substandard housing and numerous other disadvantages associated with the irresponsible use of the land and ecosystems.

As a concept, environmental justice emphasizes the distribution of responsibilities for issues such as waste disposal and water management, which invariably impact local communities. By definition, however, environmental justice is concerned with the problem of inequity in the distribution of environmental risk, yet further, serves to acknowledge “the diversity of the participants and experiences in

the environmental-justice movement” (Schlosberg 2002, p. 12); and this point is affirmed by critical theorist, Nancy Fraser (1997, p. 12), who notes, “Justice today... requires both redistribution and recognition” (as cited in Schlosberg 2002, p. 13). The significance of the latter aspect is indicated, for example, by Buzzelli (2008, p. 11), who points to a study of a landfill siting in Hamilton, Canada that found “residents were more concerned with their lack of inclusion in the planning process than with more direct environment and health linkages.” While environmental justice as recognition, or as a participatory political process, has perhaps not been as readily acknowledged, as Schlosberg (2002) suggests, with most of the attention been given to historical events in protest of the inequitable distribution of environmental responsibilities (e.g., Warren County, North Carolina),¹ the issue of recognition was adopted by the First National People of Color Environmental Leadership Conference in 1991. In this declaration, the recognition of difference and mutual respect, as well as political participation and self-determination are spelled out, for example, as “the right to participate as equal partners at every level of decision making, including needs assessment, planning, implementation, enforcement, and evaluation” (University of Colorado 2015). Yet, significant to the prospect in particular of education for sustainable development at universities, the Principles call for “the education of present and future generations, which emphasizes social and environmental issues, based on our experiences and an appreciation of our diverse cultural perspectives” (University of Colorado 2015). In mind of Stefanovic’s (2008) concerns with respect to the lack of integration of education for sustainable development with issues of social and environmental justice, there is potential (and moral imperative) in this field of study for the social sciences to contribute to an interdisciplinary, yet also community-engaged, practice of educating for sustainable development at universities that includes, in particular, the marginalized and dispossessed in a conversation about sustainable development as marked by a diversity of perspectives and worldviews as humanity makes its way into the twenty-first century.

Returning to the positions of sustainable development (Hopwood et al. 2005) in correlation with Bateson’s (1972, as cited in Sterling 2011, p. 24) levels of learning and change (Table 2), we are left with the third order of learning and change, which

¹In 1973, the State of North Carolina made plans to build a landfill for soil contaminated by 31 thousand gallons polychlorinated biphenyl (PCB); the site of the landfill was Shocco, a small town in Warren County that was 75 % African American. Local leaders organized protests against construction of the landfill, and their protests attracted support of civil rights groups across the United States that turned national attention to the issues of institutionalized environmental racism. After several lawsuits, public hearings, and scientific studies, Warren County commissioners reached a compromise with the State government in 1982, with the promise by the North Carolina State government that the landfill would not be expanded and that Warren County would not become a waste county; however, water was later discovered under the landfill, revealing contamination. Finally, in 2003, North Carolina started a program to actively destroy the PCB contamination. (http://sites.duke.edu/docst110s_01_s2011_sb211/what-is-environmental-justice/history/).

Table 2 Levels of learning and change

Orders of change/learning	Seeks/leads to	Can be labeled as
First order change, cognition	Effectiveness/efficiency	“Doing things better”—conformative
Second order change, meta-cognition	Examining and changing assumptions	“Doing better things”—reformative
Third order change, epistemic learning	Paradigm change	“Seeing things”—transformative

is concerned with the notion of transformative learning that requires essentially a shift in thinking, or a paradigm change.²

Transformative learning entails a “journey through higher orders of learning” that involves among other attributes a greater challenge or threat to existing beliefs and ideas (i.e., more resistance), more emergent learning, and the achievement of greater flexibility and less rigidity in the development of thought (Sterling 2004, p. 60) that takes educational practice in the field of sustainability potentially beyond the reform position of education as primarily “agent of change” to the notion of education as “subject of change” (Sterling 2003, pp. 22, 48). This is a point that Sterling (2003, p. 237) argues further.

I have often argued... that the achievement of individual or social change *through* education requires change *in* education.... At one level, this argument is often accepted: what is frequently not appreciated is the depth of cultural change that appears necessary both in society and in education, in the light of the sustainability imperative. The response deemed necessary in education tends to be cosmetic, while the main focus of any attention remains an instrumental and behaviourist “change *through* education,” while underlying values and contradictions “*in* education” as a system of interest go largely unexamined and unchallenged. [italics in original]

The question may be raised, however, as to whether the values underlying education for sustainable development have indeed been left unexamined because the structures and processes underlying curricula and its implementation at universities have also been left unexamined and unchallenged; that is, a rethinking, or reconceptualization, of education for sustainable development (or sustainability education) may be dependent on the developmental process in which curricula, for example, takes shape. In other words, educative practice precedes the development of theoretical perspectives and models of sustainability education. Such a process may entail a problem-based approach to questions and issues of sustainability, comprising a shift toward interdisciplinarity—including both natural and social sciences—and necessarily a commitment to engage with outlying communities on problems of direct interest to society. Such an approach to the development of

²Sterling (2003, p. 327) proposes the evolutionary (Wilberian) view of paradigm change in concert with Bateson’s (1972) levels of learning and change; this is in contrast to Thomas Kuhn’s perspective of incommensurable paradigms, where “the partial validity of earlier paradigms becomes lost in a dualistic attempt to distance the advocated paradigm from the old, and prove the validity of the new.”

sustainability curricula and programs may include an emphasis on environmental issues normally associated with the natural sciences (e.g., water pollution, soil contamination, wildlife conservation), yet also issues associated with the prospective contribution of the social sciences to sustainable development—that is, a much more comprehensive understanding of sustainable development from an environmental and economic perspective, yet also from a social and cultural point of view in keeping with the United Nations’ Rio+20 (2012) Conference, which recognizes the significance of the environmental, economic, social, and cultural dimensions of sustainable development.³

3 Conclusion

In this Chapter, the prospective contribution of education for sustainable development has been explored in light of recent developments, for example, of interdisciplinary and community-engaged curricula at Canadian universities. In this endeavour, three positions of sustainability (i.e., status quo, reform, and transformative) have been considered as a way of taking stock of the progress that has been made toward the sustainable campus, and moreover, what further work is required. Among the three positions of sustainability (Hopwood et al. 2005), the reform position is perhaps the most recognizable among sustainability programs at universities, with its emphasis on the integration of sustainability concepts into various disciplinary, and interdisciplinary, programs of study in both the natural and social sciences—the modus operandi of education for sustainable development; however, a further transition toward the sustainable campus may require a transformative approach to sustainability education, characterized by a shift in the way education itself is conceptualized—that is, a shift (as Sterling 2003 argues) from education as an “agent” of change toward education itself as a “subject” of change.

The notion of education as a change agent is reflective of various programs of “education for,” such as education for peace, education for HIV awareness, or education for sustainable development. While this approach to learning has its merits in the promotion of awareness and behavioural change, for example, it is not without limitations. Notably, the conception of education for sustainable development “breathes a kind of intellectual exclusivity and determinism that conflicts with ideas of emancipation, local knowledge, democracy and self-determination” (Wals and Jickling 2002, p. 222); and so, an important question may be raised as to how one might deal with “the inevitable tension among the divergence of interests, values, and worldviews on the one hand—and the need for the shared resolution of issues that arise in working on sustainability in higher education on the other” (Wals and Corcoran 2006, p. 103). Although a sense of solidarity, or consensus,

³The United Nations’ Rio+20 Conference recognized the importance of not endangering the cultural heritage of Indigenous peoples (<http://www.unesco.org/new/en/culture/themes/culture-and-development/the-future-we-want-the-role-of-culture/>); consequently, the concept of sustainability is now comprised of environmental, economic, social, and cultural dimensions.

may be found through the practice of educating for sustainable development, this is at once an inherent strength, yet also a weakness, especially taken within the context of universities, distinguished by the various disciplines in both the natural and social sciences, as well as outlying communities, characterized by diverse perspectives, worldviews, and material realities.

A transformative approach to education for sustainable development speaks in particular to its reconceptualization among educators at universities in the transition to the sustainable campus. In practice, however, a shift toward transformative learning may entail at the very least an integrative or interdisciplinary curriculum of problem solving, incorporating both the natural and social sciences; further, a transformative practice may also involve the inclusion of diverse ways of knowing and perspectives found among outlying communities. Regional Centres of Expertise of education for sustainable development, for example, may serve potentially as a hub, or platform, upon which interdisciplinary and community-engaged curricula for sustainability education may emerge. As an educative platform, these Centres may serve essentially as a catalyst for the transition toward a sustainable campus marked by a diverse network of perspectives, including those of the natural and environmental sciences, yet further, the social sciences, with implications for the development of curricula (and research) on issues, for instance, of social and environmental justice found in the time and place of unique urban landscapes.

References

- Association of Universities and Colleges of Canada (AUCC) (2014) Our universities, available at: <http://www.aucc.ca/canadian-universities/our-universities/>
- Barth M (2013) Many roads lead to sustainability: a process-oriented analysis of change in higher education. *Int J Sustain High Educ* 14(2):160–175
- Barth M (2015) Implementing sustainability in higher education: learning in an age of transformation. Routledge, New York
- Bateson G (1972) Steps to an ecology of mind. Chandler, San Francisco
- Becker E, Jahn T (eds) (1999) Sustainability and the social sciences: a cross-disciplinary approach to integrating environmental considerations into theoretical reorientation. UNESCO, Paris
- Bowen WM, Wells MV (2002) The politics and reality of environmental justice: a history and considerations for public administrators and policy makers. *Public Adm Rev* 62(6):668–698
- Brinkhurst M, Rose P, Maurice G, Ackerman JD (2011) Achieving campus sustainability: top-down, bottom-up, or neither? *Int J Sustain High Educ* 12(4):338–354
- Bullard RD (1993) Anatomy of environmental racism and the environmental justice movment. In: Bullard RD (ed) *Confronting environmental racism: voices from the grassroots*. Southend Press, Boston, pp 15–40
- Buzzelli M (2008) Environmental justice in Canada—it matters where you live, available at: http://www.cprn.org/documents/50875_EN.pdf
- Carson L (2007) Crossing the line: transdisciplinary education works because environmental problems and their solutions seldom respect faculty lines. *Alternatives* 33(5):44–47
- Dalhousie University (2014) College of sustainability, available at: <http://www.dal.ca/faculty/sustainability/programs.html>
- Esbjörn-Hargens S (2010) Integral theory in service of enacting integral education: illustrations from an online graduate program. In: Esbjörn-Hargens S, Reams J, Gunnlaugson O (eds) *Integral education*. State University of New York Press, Albany, pp 57–78

- Esbjörn-Hargens S, Reams J, Gunnlaugson O (2010) The emergence and characteristics of integral education. In: Esbjörn-Hargens S, Reams J, Gunnlaugson O (eds) *Integral education*. State University of New York Press, Albany, pp 1–16
- Fraser N (1997) *Justice Interruptus: critical reflections on the ‘postsocialist’ condition*. Routledge, New York
- Glasser H (2008) Hans van Ginkel: on the vision, history and status of the regional centres of expertise in ESD programmes. *J Educ Sustain Dev* 2(2):109–117
- Habron G, Goralnik L, Thorp L (2012) Embracing the learning paradigm to foster systems thinking. *Int J Sustain High Educ* 13(4):378–393
- Holdsworth S, Wyborn C, Bekessy S, Thomas I (2008) Professional development for education for sustainability: How advanced are Australian universities? *Int J Sustain High Educ* 9(2):131–146
- Hopwood B, Mellor M, O’Brien G (2005) Sustainable development: mapping different approaches. *Sustain Dev* 13:38–52
- International Institute for Sustainable Development (IISD) (1996), Sustainable development on campus: tools for campus decision makers, available at: <http://www.iisd.org/educate/>
- Intergovernmental Panel on Climate Change (IPCC) (2014) *Climate change 2014: impacts, adaptation, and vulnerability*, available at: <http://www.ipcc.ch/report/ar5/wg2>
- Johnston LF (ed) (2013) *Higher education for sustainability: cases, challenges, and opportunities from across the curriculum*. Routledge, New York
- Jones P, Selby D, Sterling S (eds) (2010) *Sustainability education: perspectives and practice across higher education*. Earthscan, New York
- Keen M, Brown V, Dyball R (eds) (2005) *Social learning in environmental management: towards a sustainable future*. Earthscan, London
- Markard J, Raven R, Truffer B (2012) Sustainability transitions: an emerging field of research and its prospects. *Res Policy* 41(6):955–967
- Matson P (2009) The sustainability transition. *Issues Sci Technol* 25(4):39–42
- Mobley C, Lee C, Morse JC, Allen J, Murphy C (2014) Learning about sustainability: an interdisciplinary graduate seminar in biocomplexity. *Int J Sustain High Educ* 15(1):16–33
- Mochizuki Y, Fadeeva Z (2008) Regional centres of expertise on education for sustainable development (RCEs): an overview. *Int J Sustain High Educ* 9(4):369–381
- O’Rafferty S, Curtis H, O’Connor F (2014) Mainstreaming sustainability in design education—a capacity building framework. *Int J Sustain High Educ* 15(2):169–187
- Redclift M (1999) Dance with wolves? Sustainability and the social sciences. In: Becker E, Jahn T (eds) *Sustainability and the social sciences: a cross-disciplinary approach to integrating environmental considerations into theoretical reorientation*. UNESCO, Paris, pp 267–273
- Roberts J (2013) Experiencing sustainability: thinking deeper about experiential education in higher education. *J Sustain Educ*, available at: <http://www.jsedimensions.org/wordpress/?s=%22social+sciences%22+%22higher+education%22>
- Schlosberg D (2002) *Environmental justice and the new pluralism*. Oxford University Press, Oxford
- Sedlacek S (2013) The role of universities in fostering sustainable development at the regional level. *J Clean Prod* 48:74–84
- Sibbel A (2009) Pathways towards sustainability through higher education. *Int J Sustain High Educ* 10(4):68–82
- Singleton J (2015) Head, heart and hand model for transformative learning: place as context for changing sustainability values. *J Sustain Educ*, available at: <http://www.jsedimensions.org/wordpress/?s=%22social+sciences%22+%22higher+education%22>
- Stefanovic IL (2008) Educational alliance for a sustainable Toronto: the University of Toronto and the city’s United Nations University (UNU) regional centre of expertise. *Int J Sustain High Educ* 9(4):416–427
- Stein R (ed) (2002) *New perspectives on environmental justice*. Rutgers University Press, New Brunswick

- Sterling S (2003) Whole systems thinking as a basis for paradigm change in education: explorations in the context of sustainability, available at: <http://www.bath.ac.uk/cree/sterling/index.html>
- Sterling S (2004) Higher education, sustainability, and the role of systemic learning. In: Corcoran PB, Wals AEJ (eds) Higher education and the challenge of sustainability: problematics, promise, and practice. Kluwer Academic, Dordrecht, pp 47–70
- Sterling S (2011) Transformative learning and sustainability: sketching the conceptual ground. *Learn Teach High Educ* 5:17–33
- Sterling S (2013) The sustainable university: challenge and response. In: Sterling S, Maxey L, Luna H (eds) The sustainable university: progress and prospects. Routledge, Abingdon, pp 17–50
- Sterling S, Maxey L (2013a) Introduction. In: Sterling S, Maxey L, Luna H (eds) The sustainable university: progress and prospects. Routledge, Abingdon, pp 1–14
- Sterling S, Maxey L (2013b) The sustainable university: taking it forward. In: Sterling S, Maxey L, Luna H (eds) The sustainable university: progress and prospects. Routledge, Abingdon, pp 304–317
- Stubbs W, Schapper J (2011) Two approaches to curriculum development for educating for sustainability and CSR. *Int J Sustain High Educ* 12(3):259–268
- Thiele LP (2013) Sustainability. Polity, Malden
- Thomas I, Day T (2014) Sustainability capabilities, graduate capabilities, and Australian universities. *Int J Sustain High Educ* 15(2):208–227
- Tovey H (2009) Sustainability: a platform for debate. *Sustainability* 1(1):14–18
- United Nations Conference on Sustainable Development: Rio + 20 (2011) Higher education sustainable initiative, available at: <http://uncsd2012.org/index.php?page=view&type=1006&menu=153&nr=34>
- United Nations Economic Commission for Europe (UNECE) (2005) Copernicus—guidelines for sustainable development in the European higher education area, available at: <http://www.unece.org/fileadmin/DAM/env/esd/information/COPERNICUS%20Guidelines.pdf>
- United Nations Sustainable Development (UNSD) (1992) Agenda 21, available at <https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf>
- United Nations University Institute of Advanced Studies (UNU-IAS) (2013a) Regional centres of expertise (RCE), available at: http://archive.ias.unu.edu/sub_page.aspx?catID=1849&ddlID=183
- United Nations University Institute of Advanced Studies (UNU-IAS) (2013b) Unbuntu declaration, available at: http://archive.ias.unu.edu/sub_page.aspx?catID=108&ddlID=304
- University of Alberta (2014a) Campus sustainability initiative, available at: <http://www.sustainability.ualberta.ca>
- University of Alberta (2014b) Community service learning, available at: <http://www.csl.ualberta.ca/en/About%20Us.aspx>
- University of British Columbia (2014a) Centre for community engaged learning, available at: <http://students.ubc.ca/about/centre-community-engaged-learning>
- University of British Columbia (2014b) Our commitment, available at: <http://sustain.ubc.ca/our-commitment>
- University of Colorado (2015) Environmental justice, available at: <http://www.colorado.edu/center/environmental-justice>
- Vaughter P, Wright T, McKenzie M, Lidstone L (2013) Greening the ivory tower: a review of educational research on sustainability in post-secondary education. *Sustainability* 5:2252–2271
- Wals AEJ, Corcoran PB (2006) Sustainability as an outcome of transformative learning: Goteburg workshop. In Holberg J, Samuelson BE (eds) Drivers and barriers for implementing sustainable development in higher education. UNESCO Education Sector (Technical Paper no. 3), Paris, pp 103–110
- Wals AEJ, Jickling B (2002) Sustainability' in higher education: from doublethink and newspeak to critical thinking and meaningful learning. *Int J Sustain High Educ* 3(3):221–232

- Western University (2015) The student experience centre, available at: <http://www.success.uwo.ca/experience/index.html>
- World Commission on Environment and Development (WCED) (1987) Report of the world commission on environment and development: our common future, available at: <http://www.un-documents.net/our-common-future.pdf>
- Wright T (2010) Stepping up to the challenge: the Dalhousie experience. In: Johnston LF (ed) Higher education for sustainability: cases, challenges, and opportunities from across the curriculum. Routledge, Abingdon, pp 201–213

Author Biography

P. Kolenick Having received a Doctorate in Educational Leadership and Policy at the University of British Columbia, the author is currently a sessional instructor with the Faculty of Education at the University of Regina (Canada), and Athabasca University (Canada), with a focus on sustainability education and policy research. Paul is also an active member of RCE Saskatchewan.