To my children, and my students, that I may one day be worthy of their love
ACKNOWLEDGMENTS

I thank my parents for their love and devotion. I thank my wife for her beauty, laughter, and grace. I thank my committee and especially my mentor, Les Thiele, who has done so much to develop these ideas with me over the past five years.
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This dissertation explores and contributes to an understanding of sustainability education in American universities and colleges, and grounds sustainability education reform efforts in the ongoing tradition of Deweyan democratic citizenship education. To accomplish this, I employed a mixed methods content analysis of sustainability degree programs and syllabi, student and educator interviews, and sustainability students’ products of learning and opinion surveys. The research identifies an emergent form of Deweyan democratic citizenship education within sustainability education program offerings, and specifically with regard to skills development in critical systems thinking and transdisciplinary communication and collaboration. The research suggests an important place for liberal arts programs in the achievement of this skill set. To the extent liberal arts educators can embrace the new learning skills of the 21st century without losing their core commitments to critical thinking and personal expression, they are poised to prepare students critically, creatively and collaboratively to grapple with the pressing environmental and social challenges of our times.
CHAPTER 1
OVERVIEW OF THE DISSERTATION

Human history becomes more and more a race between education and catastrophe.
-HG Wells
Outline of History

This then is the task indicated. It is, if we employ large terms, to humanize science. This task in the concrete cannot be accomplished save as the fruit of science, which is named technology, is also humanized. And the task can be executed in the concrete only as it is broken up into vital applications of intelligence in a multitude of fields to a vast diversity of problems so that science and technology may be rendered servants of the democratic hope and faith.
-John Dewey
The Democratic Faith and Education

Introduction

This dissertation explores and contributes to an understanding of sustainability education in American universities and colleges, and grounds sustainability education reform efforts in the ongoing tradition of Deweyan democratic citizenship education. To accomplish this, I employed a mixed methods content analysis of sustainability degree programs and syllabi, student and educator interviews, and sustainability students’ products of learning and opinion surveys. The research identifies an emergent form of Deweyan democratic citizenship education within sustainability education program offerings, and specifically with regard to skills development in critical systems thinking and transdisciplinary communication and collaboration. The research suggests an important place for liberal arts programs in the achievement of this skill set. To the extent liberal arts educators can embrace the new learning skills of the 21st century without losing their core commitments to critical thinking and personal expression, they are poised to prepare students critically, creatively and collaboratively to grapple with the pressing environmental and social challenges of our times.

This introductory chapter introduces the reader to the theoretical underpinnings and primary framework for the research. It first situates the work in the context of
contemporary higher education efforts to achieve a relevant form of civics education for
students, and recognizes the increasing institutional and economic pressures on the
liberal arts programs that traditionally provide civic training. Next the chapter introduces
key philosophical and pedagogical works of John Dewey, which guide the research and
provide the historical context for democratic citizenship education. After this the chapter
introduces sustainability education, and argues for a refined understanding of the “social
sphere” of sustainability, by way of empowering education initiatives. Next the chapter
introduces the two-part skills framework of critical systems thinking and transdisciplinary
communication and collaboration which guided the content analysis. Lastly, the chapter
provides brief abstracts for each of the remaining chapters of the dissertation.

The Liberal Arts and Citizenship Education in American Universities and Colleges

American Colleges and Universities have long embraced a civic mission that is
rooted in developing within citizens the knowledge, skills, and values needed to sustain
and improve communities and nations.\(^1\) American Political Science was founded with a
civic educational mission, which was assumed to be required for a democratic people to
maintain their freedom.\(^2\) That mission has undergone severe challenges and revisions,
and it has been neglected for some time.\(^3\) But civics is once again at the forefront of

---

\(^1\) John Dewey, *Democracy and Education* (Simon & Brown, 1916); Émile Durkheim, *Education and
Sociology* (Free Press, 1956); Lawrence Arthur Cremin, *The Transformation of the School: Progressivism
in American Education, 1876-1957* (Knopf, 1961); Thomas Ehrlich, *Civic Responsibility and Higher

\(^2\) James Farr, John S. Dryzek, and Stephen T. Leonard, eds., *Political Science in History: Research
Programs and Political Traditions* (Cambridge University Press, 1995).

\(^3\) As explained by Stephen White: “In the latter half of the nineteenth century, many of those who would
become prominent as “founding fathers” of academic political science were also among the most active
advocates of higher education in the United States. This education reform movement was, as many
historians of higher education have noted (see, e.g. Cremin 1980; Luca 1994; Ross 1991; Rudolph 1990),
itimately linked with agitation for political reform.” And yet, from 1900 up to the 1940s, this mandate was
exceedingly displaced by the goal of producing quality research, to the extent that, in 1920 the chair of
political and educational conversations. Theorists and practitioners of civics education alike have identified and begun to address the challenging task of preparing students for participation in 21st century democratic societies. The skill sets of critical thinking and collaborative problem solving, while germane to civics education, are also today understood to provide the foundation for the creative and collaborative teamwork skills that innovating businesses require from their employees.

At its best, contemporary civics education challenges students to be competent contributors to diverse societies embedded within a globalized system characterized by increasing interdependence in economic, political, cultural, environmental, and communication spheres. Accordingly, civics education pedagogy develops the skills

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7 “IEA Civic Education Study Technical Report” (Amsterdam: The International Association for the Evaluation of Educational Achievement, 2004). Global University Network for Innovation, Higher
required for the navigation and sustaining of complex, interdependent systems.8 Sustainability education is rooted in this same skill set.9 And sustainability learning outcomes are guiding the development of innovative pedagogical practices, oriented around “skills for a changing world.”10

Despite its longstanding role in delivering civic education, the value of the liberal arts is challenged in contemporary political discourse. A recent New York Times article titled, “A Rising Call to Promote STEM Education and Cut Liberal Arts Funding,” documents efforts by governors in Kentucky, Florida, and North Carolina, along with a number of US senators, to shift public funding away from the liberal arts and towards STEM (Science, Technology, Engineering and Mathematics); the efforts of these politicians are made defensible on the premise that STEM degrees will earn graduates

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The introduction of the No Child Left Behind Act and its selective measures of success contributed to a marked decrease in the time students at all grades and especially elementary school spend on civics and social studies learning. The loss of the liberal arts could endanger future generations’ opportunity to develop the skills and dispositions associated with civics education, especially critical thinking and ethical reasoning. Civics education does not solely, or even primarily, involve increasing students’ knowledge of governmental processes. Civic learning and civic engagement empower students “as agents of positive social change for a more democratic world.” Education for democratic citizenship entails acknowledging responsibilities beyond individual interests, identifying means of involvement for responsible agents of change, and developing specific values such as trust, empathy, motivation and commitment. Most basically, civics education demands the development of critical thinking skills,

\[\text{11} \quad \text{And yet even as students and families begin to invest more of their personal wealth and debt in higher education, it offers them less assurance of a job. It is unclear regarding what the up and coming workforce will be doing, except for the certainty that it will be done in competition within the global market place.} \]

\[\text{12} \quad \text{The conclusion, questionable on a number of fronts, is that more graduates in STEM programs are needed if the US will maintain its “edge”. Stem workers currently make up less than 6% of the workforce, but Obama has called for a million new STEM graduates and 100,000 new teachers in these fields over the next decade. Michael Anft, “The STEM Crisis: Reality or Myth?” The Chronicle of Higher Education, November 11, 2013; Patricia Cohen, “A Rising Call to Promote STEM Education and Cut Liberal Arts Funding,” The New York Times, February 21, 2016, http://www.nytimes.com/2016/02/22/business/a-rising-call-to-promote-stem-education-and-cut-liberal-arts-funding.html.} \]

\[\text{13} \quad \text{Jacoby and Ehrlich, Civic, 9.} \]

communication skills and collaborative problem solving skills. The liberal arts can today be understood as providing valuable opportunities for students in the realms of personal growth and civic purpose, but only so long as the skills and dispositions it offers remain contextually relevant, and only so long as access to this education is affordable.15

The top universities now charge around $250,000 for four years of schooling, and the nation’s student loan debt has surpassed its total credit card debt.16 At the same time, the for-profit education sector grew by 235% between 2000 and 2010, and it now makes up over 25% of all post-secondary institutions in the U.S.17 College course and program offerings are increasingly motivated by credit hour production rather than educational quality.18 From 2007 to 2010, PhD’s on food stamps and public assistance more than tripled.19 All this in an economic climate where over half our recent college graduates are unemployed or underemployed.20 With these sorts of figures at hand, it is easy for the cynic to suggest there is no room in an overly crowded system of education


19From 9,776 to 33,655, as reported in Gabriel Winant, “Grad Students to the Barricades,” Dissent, Fall 2012.

reform for improved learning and civic skills.\textsuperscript{21} But the overall decline of civic behavior in the United States suggests otherwise, and prominent civic authors have confirmed as much:

For various reasons, the solidaristic organizations that dominated the US landscape from the 1930s through the early 1960s have weakened, and the principle of individual choice has emerged as our central value. Indeed, citizenship itself has become optional, as the sense of civic obligation (to vote or to do anything else of civic consequence) has faded and as the military draft has been replaced by all-volunteer armed forces. When the chips are down, we prefer exit to voice, and any sense of loyalty to something larger than ourselves has all but disappeared. In this context, the experience of collective action directed toward common purposes is one of the few conceivable counterweights to today’s hyper-extended privilege of individual choice.\textsuperscript{22}

\textsuperscript{21} The problem of unemployment is not unique to the liberal arts in the present economy, yet Florida Governor Rick Scott advocates freezing or discounting tuition rates for STEM degrees, and making it more difficult and expensive for humanities, arts, and social science programs. With this sensibility competitive market capitalism, Tom Snyder, president of Ivy Tech Indiana, the nation’s largest singly accredited community college system, writes, “Today’s economy cannot support more art history or philosophy majors. Students and their parents must consider careers in STEM...That’s where the jobs are, and there is an inexpensive, quick way to qualify for these jobs —enrolling at a community college.” Tom Snyder, “Bachelor’s Degree in Liberal Arts Is a Poor Investment,” \textit{Huffington Post}, November 28, 2012.

\textsuperscript{22} William Galston and Mark Lopez in Laura Wilson, \textit{Civic Engagement and the Baby Boomer Generation: Research, Policy, and Practice Perspectives} (Routledge, 2012), p.18.
possibility of such an education is more and more at risk. Just as arguments are made for the increased participation of the public in democratic decision making and environmental management, the education that would prepare citizens for these functions is being dismantled, and funding is shifting to high tech and big data. Just as access to public education is being granted to a great majority, the quality of the education is under pressure to reduce itself to vocational training.  

Despite the barrage of attacks on the value of the liberal arts, civic education has “achieved new visibility alongside the traditional academic mission of higher education.” Caryn Musil, current Director of Civic Learning and Democracy Initiatives for the Association of American Colleges and Universities (AAC&U), celebrates this renewed vision of civic engagement, but she bemoans the helter skelter way that many institutions are going about attempting to achieve an active civics curriculum. Musil reports:

Its definition has crystallized through reform movements that have begun to coalesce: the diversity movement; the civic engagement movement; and the movement to create more student-centered institutions. All three argue that students need to be prepared to assume full and responsible lives in an interdependent world marked by uncertainty, rapid change, and destabilizing inequalities. Each recognizes the societal and cognitive development that results when students step out of their comfort zones.

23 Of course, it is given that more is lost than civic capacity when education is reduced to technical vocational training. Liberal Education, writes political philosopher, Leo Strauss, “consists in the constant intercourse with the greatest minds, is a training in the highest form of modesty, not to say of humility. It is at the same time a training in boldness: it demands from us the complete break with the noise, the rush, the thoughtlessness, the cheapness of the Vanity Fair of the intellectuals as well as of their enemies. It demands from us the boldness implied in the resolve to regard the accepted views as mere opinions, or to regard the average opinions as extreme opinions which are at least as likely to be wrong as the strangest or the least popular opinions. Liberal education is liberation from vulgarity. The Greeks had a beautiful word for “vulgarity”; they called it apeirokalia, lack of experience in things beautiful. Liberal education supplies us with experience in things beautiful.” Leo Strauss, “What Is Liberal Education,” 1959.

into contact zones. All emphasize student-centered pedagogies that foster engaged, participatory learning dependent on dialogue and collaboration.\textsuperscript{25}

Musil’s description indicates that it is not only by relevance, but by an adaptation of civics to the contemporary need: “uncertainty, rapid change, and destabilizing inequalities,” that civics is once more a topic of discussion with “new visibility.”

Conceptions of 21\textsuperscript{st} century civic learning are presented as new and innovative forms of citizenship designed to overcome academic divisions and infuse technical training with moral content, where “the ‘work of the mind’ fuses with the ‘welfare of the world.’”\textsuperscript{26} The enduring value of the liberal arts is today found in new syntheses of liberal and scientific content. This runs against the more traditional notion that liberal education occurs in departments distinct from the sciences, and that liberal education occurs in courses devoid of scientific content. Contemporary conceptions of liberal learning, including civic education opportunities, are experiential and interdisciplinary: “Liberal education in the university refers to activities which are designed to cultivate intellectual creativity, autonomy and resilience; critical thinking; a combination of intellectual breadth and specialized knowledge; the comprehension and tolerance of diverse ideas and experiences; informed participation in community life, and effective communication skills.”\textsuperscript{27} While theorists and educators for civics identify the humanities, the social sciences, and the fine arts as the conventional homes of such efforts, they also

\textsuperscript{25} Ibid., 2.

\textsuperscript{26} Brunner, p2, citing Musil 2003

increasingly see a need to integrate civic education into scientific, professional, and technical studies as well.\textsuperscript{28}

This idea of enriching scientific and technical training with liberal, civically minded content is not a new idea in any respect. It was in fact the focus of John Dewey’s “The Democratic Faith and Education”. Dewey’s essay from 1944 reflects on historical events of the first half of the twentieth century in the United States, and how far the country appeared to be from the dreams of peace and prosperity that were supposed to have accompanied the scientific and technological revolutions of new industry. “The Democratic Faith and Education” is a corner stone of this dissertation, which explores the extent to which an emergent form of Deweyan education for democratic citizenship might be located in the rise of sustainability education.\textsuperscript{29}

\textbf{Dewey’s Democratic Faith}

John Dewey’s (1859-1952) ideas continue to impact a wide range of social and philosophical research. His work is foundational to the philosophical approach of pragmatism, the psychological approach of functionalism, and student-centered and experientially based theories of education in service to democracy. His career as a published author spanned 65 years.

Dewey thought the death blow to democracy would be an education system that allowed “liberal education for a small, elite group and vocational education for the

\textsuperscript{28} Ibid.

\textsuperscript{29} The dissertation also includes reference to Dewey’s “Evolution and Ethics” (1898), \textit{Democracy and Education} (1916), \textit{The Public and Its Problems} (1927), \textit{The Quest for Certainty} (1929), \textit{Experience and Education} (1938), and \textit{Freedom and Culture} (1939).
masses.” His emphasis on the democratic responsibility of education has carried through into contemporary theories of democracy. For instance, Benjamin Barber emphasizes the democratic utility of skills in participation, critical thinking, deliberate action, and empathy. He writes, “In the tradition of Jefferson and Dewey… liberal education [is] democratic education… public education is education for citizenship. In aristocratic nations, in elitist regimes, in technocratic societies, it may appear as a luxury. In such places, education is the private apprenticeship in the professions, the credentialing of elites… But in democracies, education is the indispensable concomitant of citizenship. Where women and men would acquire the skills of freedom, it is a necessity.”

Dewey’s democratic education is public, inclusive and diverse. Inclusivity and diversity are maintained by open communication, and the public wellbeing is served through free and open experimentation and inquiry.

As early as 1898, Dewey argued that humanity must engage in conscious, adaptive learning if it is to succeed in the face of rapid change and expansive complexity. Dewey saw the communities of the world spreading out as a result of globalization. He worked with immigrant communities at Hull House and he anticipated there would be a great need for increased abilities in communication and collective decision making in a global world. By employing “intelligent and controlled foresight,” citizens can and should both maintain the cultural and political institutions they have

---


inherited while adapting them to a changing world.\textsuperscript{33} He grounded his adaptive lifelong learning approach in skills of critical analysis and communication.

Dewey’s pragmatism is a philosophical pole star for research projects focused on the practical outcomes of learning and the pedagogical potential of “learning by doing.”\textsuperscript{34} Rather than thinking of knowledge acquisition and learning in terms of dualisms such as mind and body, Dewey understood learning in terms of interactions. Dewey called this “The Copernican turn” in philosophy, a turn from mind to “indefinite interactions”.\textsuperscript{35} Dewey’s shift to interaction connects him with important components of contemporary sustainability education, including environmental awareness, systems thinking, emphasis on unintended consequences, and social learning.

Dewey is well known for promoting an active citizenry, deep participation in community, and the role of experiential education in promoting democratic citizenship. He worked specifically to answer the questions of how education might adapt to the changing circumstances of the 20\textsuperscript{th} century. In “The Democratic Faith and Education” Dewey describes a form of democratic citizenship education based on the integration of scientific and humanistic understanding. The old faith that failed the first half of the twentieth century was in the natural “progress” or evolution of humans, which gave little attention to how science and technology were actually deployed; to what ends


\textsuperscript{34} Gert Biesta and Nicholas Burbules, \textit{Pragmatism and Educational Research} (Rowman & Littlefield Publishers, 2004), 9

inventions and markets were directed. There was thus a great division between the scientific and the humanistic.

The new faith, says Dewey, begins with the recognition of humanity’s special capacity to learn and communicate – culture. Thus, for the human race, goals aligned with the democratic faith, such as wellbeing, liberty of belief and expression, and sanctity of life, will only be realized if humans apply their scientific ability, their intelligence, directly to the goals of their societies, not incidentally or passively.36 “The Democratic Faith and Education” was originally published in *The Antioch Review* in the summer of 1944, just after the D-Day invasion of Normandy. Dewey begins the essay admitting that “the ardent social idealist of the last half century or so has been proved so wrong.”37 The essay addresses the dark reality of the present, and asks how it strayed so far from the progressive vision of the beginning of the 20th century.38

The old faith in progress as the natural, evolutionary unfolding of societies had been checked by the devastation of wars. The fault of the old faith was that it rested in a trust of “nature” and the “natural” progression of man. There existed “a widespread trust in the ability of impersonal forces, popularly called nature, to do a work that has in fact

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36 “The obvious fact is that our social life has undergone a thorough and radical change. If our education is to have any meaning for life, it must pass through an equally complete transformation.” John Dewey, *The School and Society* (University of Chicago Press, 1900).


38 “Instead of universal peace,” laments Dewey, “there are two wars worldwide in extent and destructive beyond anything known in all history. Instead of uniform and steady growth of democratic freedom and equality, we have the rise of powerful totalitarian states with thoroughgoing suppression of liberty of belief and expression, outdoing the most despotic states of previous history…Instead of promotion of economic security and movement toward the elimination of poverty, we have had a great increase in the extent and the intensity of industrial crises with great increase of inability of workers to find employment. Social instability has reached a point that may portend revolution if it goes on unchecked.” Ibid., 275
to be done by human insight, foresight, and purposeful planning.” His description of
the damage from the world wars of the first half of the twentieth century ring even truer
at the time of this dissertation, which is in the wake of more than two decades of war in
oil rich regions and an economy crumbling under its own corrupt practices: “The
consequences were wholesale destruction and waste of natural resources, increase of
social instability, and mortgaging of the future to a transitory and brief present of so-
called prosperity.” The point of the essay, however, was not for Dewey to chronicle the
failures of the early twentieth century, but to speak to how the old faith in progress erred
in assuming progress to be a natural outcome of human development, which he calls “a
policy of drift.” Instead, argues Dewey, humanity must now come to realize that “the
responsibility for creating a state of peace internationally, and of freedom and economic
security internally, has to be carried by deliberate cooperative human effort.” Science
and technology will only work in the service of flourishing democratic societies if the
potential of science and technology is harnessed responsibly and proactively to that
end. Following this premise, Dewey offers a new democratic faith, based upon
education.

The old faith’s view of the “natural” progress of humanity can be explained as a
misunderstood Darwinian explanation of the potential of science and technology. Dewey

39 Ibid., 276

40 Ibid.

41 He writes, “If “idealists” were misguided in what they failed to do, “realists” were wrong in what they
did. If the former erred in supposing that the drift (called by them progress or evolution) was inevitably
toward the better, the latter were more actively harmful because their insistence upon trusting to natural
laws was definitely in the interest of personal and class profit.” Ibid., 276.

42 Ibid.
corrects this view in his writings on Darwin. He credits Darwin with engendering the paradigm shift from essence thinking to process thinking, an important basis for the development of systems thinking. But Dewey also takes Darwin’s insights and adapts them for the special case of humanity, arguing that experience had always been the way by which creatures learn and adapt, but that humans had become conscious of the process of experience, reflection, and adaptation, and so could work toward improving this process.  

Education for adaptive learning recognized that the complexity of the world would resist singular solutions, and thus required the incorporation of the greatest diversity of responses to any given situation. He wrote, “In the present environment, flexibility of function, the enlargement of the range of uses to which one and the same organ, grossly considered, may be put, is a great, almost supreme, condition of success...in a word, the difference between man and animal is not that selection has ceased, but that selection along lines of variations which enlarge and intensify the environment is active as never before.” 

Dewey believed learning is the positive outcome of “right” experience, and so intelligence is largely a capacity for adaptation to new situations. He dreamed of a democratic culture of rich experiences informing a flexible and adaptive process of ongoing learning.

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45 This was his solution to the primary philosophical problem he identified in regards to the development of American Pragmatism. It is, he wrote, “an inner demand for an intellectual technique that would be
Through this humanistic interpretation of Darwin, and his recognition of humanity’s ability to adapt not just in evolutionary time, but far more quickly through culture, Dewey identified an inspired new interdisciplinary application of the scientific method, based upon continuous progress and improvement in our ability to individually and socially learn and interact with our environment.\textsuperscript{46} The democratic faith involved more and better learning opportunities. Three years after the publication of Dewey’s “The Democratic Faith and Education,” his vision was mirrored in President Truman’s Commission on Higher Education.\textsuperscript{47}

Alongside foundational writings on democratic education, Dewey made significant headway in the development of systems thinking.\textsuperscript{48} In Deweyan fashion, he summarized the contemporary notions of complexity and interdependence in his use of the terms “situation” and “association.”\textsuperscript{49} With this understanding of complex relationality consistent and yet capable of flexible adaptation to the concrete diversity of experienced things.” John Dewey “Freedom and Culture” reprinted in Hickman and Thomas vol2, 362.

\textsuperscript{46} Dewey’s take on adaptive learning is explained in further detail in the next chapter.

\textsuperscript{47} Truman’s commission identified the overall goals of education as: “Education for a fuller realization of democracy in every phase of living; Education directly and explicitly for international understanding and cooperation; Education for the application of creative imagination and trained intelligence to the solution of social problems and to the administration of public affairs.” Cited in Caryn Musil, “CIVIC PROMPTS: Making Civic Learning Routine Across the Disciplines” (Washington DC: Association of American Colleges and Universities, 2015).


\textsuperscript{49} He writes, “In actual experience, there is never any such isolated singular object or event; an object or event is always a special part, phase, or aspect, of an environing experienced world – a situation.” John Dewey, Pragmatism and Culture, 1938, reprinted in Hickman and Alexander \textit{Vol1}, 384. LW 12:71. The adequacy of any given account of a situation, he writes, is “found in the extent to which that account is based on taking things in the widest and most complex scale of associations open to observation” John Dewey, “The Inclusive Philosophical Idea” 1928, , reprinted in Hickman and Alexander \textit{Vol1}, 309. For more on Dewey’s commonalities with systems thinking, see Seaton Patrick Tarrant and Leslie Paul Thiele, “Practice Makes Pedagogy – John Dewey and Skills-Based Sustainability Education,” \textit{International Journal of Sustainability in Higher Education} 17, no. 1 (2016), 54–67.
Dewey was able to develop a theory of learning based on interaction with others and with the broader environment of which we are a part.\textsuperscript{50}

But Dewey’s theory of learning and sensitivity to environments never included what we might today call environmental awareness. Indeed, within “The Democratic Faith and Education” Dewey refers in a fairly celebratory tone to the “conquest of physical nature.” Though he laments the waste of natural resources resulting from the war, he had no explicit environmental agenda. It would be another thirty years before the field of applied ecology developed its first intensive and extensive studies of ecosystems; it was at this point that C.S. Holling (1973) began to articulate the inherent instability of natural systems, including systems impacted by human interaction.

Still, the Deweyan theory of learning is discernible in contemporary environmental management, sustainability, and environmental education literatures.\textsuperscript{51}

\textsuperscript{50} Dewey writes, “To “learn from experience” is to make a backward and forward connection between what we do to things and what we enjoy or suffer from things in consequence…. Under such conditions, doing becomes a trying; an experiment with the world to find out what it is like; the undergoing becomes instruction--discovery of the connection of things.” Dewey, \textit{Democracy and Education}, ch.11

Alongside Dewey’s “The Democratic Faith in Education,” the 1944 Summer issue of Antioch included articles on the labor rights of farm workers, future directions for agriculture, and new management schemes for natural resources following the increasingly global reach of industry, including titles such as “Raw Materials, Key to the Future.” In that same year, 1944, the Bretton Woods conference occurred and the World Bank was born. International Development became a globally financed “first world” priority. Speaking at the Bretton Woods conference in 1944, FDR proclaimed, “the economic health of every country is a proper matter of concern to all its neighbors, near and far.”

Harry Truman embedded this theme in his inauguration address, five years later: “We must carry out our plans for reducing the barriers to world trade and increasing its volume. Economic recovery and peace itself depend on increased world trade…we should foster capital investment in areas needing development…Greater production is key to prosperity and peace.”

It was not at that time clear that economic development could hit the wall of limited natural resources, especially in terms of the natural resources that absorb the waste streams of industrialization.

John Dewey died in 1952, and did not see the rise of the post-Malthusian ecological scarcity thesis, or the increased awareness of the unintended environmental harms associated with industrial practices. Dewey was not there to see the World

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54 That awareness is marked in popular history by the (1962) publication of Rachel Carson’s Silent Spring, which warned against industrial chemicals poisoning ecosystems, and accused the chemical
Bank become challenged with balancing economic investment and the global necessity of operating within the limits of the biosphere. But Dewey did see society’s tendency to believe the key to progress was more economic growth and more technological innovation, without a sense of how these technologies would function, or what the external costs of more economic growth might be. Dewey recognized his society’s insensitivity to consequences, especially unintended consequences occurring in increased spatial and temporal contexts. His response was to suggest a renewed democratic mission for education, based in an integration of sciences and liberal learning. The task, he writes, is “to fill education having an occupational direction with a genuinely liberal content…to humanize science.”


55 Since the 1970s, Daly has suggested that capitalism can be reoriented away from growth and toward quality of life, via a steady-state economy (1973, *Towards a Steady State Economy*.) When Herman Daly retired from the World Bank in 1994, he delivered a farewell speech that included specific reform measures: 1) the consumption of natural resources should not count as income, 2) resource throughput should be taxed more than labor and income, 3) maximize the productivity of natural capital in the short run, and invest in increasing its supply in the long run, 4) Move away from global economic integration by free trade and seek instead to develop domestic production for internal markets as a first option. Herman E. Daly, ed., *Towards a Steady-State Economy*, illustrated edition (W.H.Freeman & Co Ltd, 1973). Daly’s list can be accessed at the sustainability institute’s Donella Meadows archive: http://www.sustainer.org/dhm_archive/index.php?display_article=vn530dalyed).

56 Dewey’s suggestion should not be confused with efforts to model the natural scientific model within social studies. For readings on this, which can potentially help clear Dewey’s distinct agenda, see the essay on political theorist Charles Taylor by Clifford Geertz, which opens with reference to Taylor’s self-proclaimed polemic against “the ambition to model the study of man on the natural sciences.” The obvious danger, as Geertz describes it, is that, “we are not confronted with an articulated description of a living institution, one with a great deal of history, a vast amount of internal diversity, and an open future, but with a stereotype and a scarecrow - a Gorgon’s head that turns agency, significance, and mind to stone” (144). Geertz’s point however, is not to take up Taylor’s same argument. Rather, he points out that today the tendency to make simple, predictable objects out of human study is rampant in both human and natural sciences, and the tendency can be no less avoided by making an “other” or simple object of the natural sciences, than it can by objectifying a human subject or human social phenomenon. He writes, “the creation of an out-and-out, fixed and uncrossable gulf between the natural and human sciences is both too high and unnecessary a price to pay…The tendency toward oversimplification Taylor so rightly deplores seems to thrive, in both the human and natural sciences, precisely to the degree that the intellectual traffic between them is obstructed by artificial notions of primordial separateness” (146).
conducted in support of this dissertation is that just such an integration appears to be occurring within sustainability studies programs.\textsuperscript{57}

Reflecting on the tragic fact of two world wars, a great depression, and famines across the globe, Dewey warned that technology and economic development are not neutral forces, and they cannot on their own ensure a flourishing democracy. Dewey identified a new form of civics education, based on an integration of seemingly distinct types of education, so that our tradition of liberal and humanist learning could learn from, and oversee, the appropriate application of science and technology.\textsuperscript{58} This education would help ensure that science and technology work in the service of the public good, and that the public good is defined anew in each generation by an active and capable citizenry.

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\textsuperscript{57} For example, the following is an excerpt from the sample of program descriptions: “The Bachelor of Arts degree in Sustainability Studies is designed to instill a deep knowledge of the pressing environmental issues of the 21st century while providing a thorough grounding in the liberal arts. This means that the major provides the same type of broad-based knowledge as more traditional liberal arts majors but with a cutting-edge environmental focus.

The program’s goals include:

\begin{itemize}
\item Engaging students in the critical public policy debates surrounding consumption, energy usage and viable economic growth;
\item Fostering students’ environmental literacy using rigorous, scholarly based research in the natural sciences, social sciences and humanities; and
\item Exploring social justice issues on a range of fronts, including environmental justice, resource allocation, urban development and social equity.
\end{itemize}

Each Sustainability Studies course is by design interdisciplinary. It combines the best of the humanities, social sciences, and natural sciences to bring each of these methods to bear on sustainability questions. (22)

\textsuperscript{58} Dewey \textit{The Faith}, 282.
Tarrant and Thiele (2016) suggest, along with Prugh et al. (1999), that Dewey’s dream suffers primarily from having never been tried, and that sustainability education may be democratic education’s defining moment. What it might take for sustainability education to live up to this challenge is no simple thing to explain. What sustainability education mustn’t do, we learn from Dewey, is to adopt an overly simplistic orientation to technology and innovation, or a blind faith in markets, which will erode what is left of the liberal, civic-minded content of higher education.

This dissertation asks whether sustainability education might achieve Dewey’s solutions-oriented, synthetic educational vision for democratic flourishing. To varying degrees, an ecologically informed version of Deweyan civic education, based on his conception of the integration of technical education and liberal education, and his application of the scientific method to our understanding of the process of learning, is occurring in sustainability education within higher education in at least two ways: the first is the adapted cognitive skillset of critical systems thinking; the second is the adapted interpersonal skillset of transdisciplinary communication and collaboration. So understood, sustainability education includes systems thinking approaches to complex problems, and normative commitments and capabilities in more inclusive and democratic policies and practices. The remainder of this introductory chapter works to introduce what is meant by these two forms of Deweyan civic learning within sustainability education, and what the potential implications of this education are for sustainability education and its commitment to social justice.

**Sustainability**

Besides the liberal arts disciplines traditionally involved in the development of critical thinking and collaborative problem solving linked to citizenship, such as Political
Science, Sociology, as well as English and History, there is a call to reconceive how and where civics education might be fostered in higher education. As civics proponent and director of civic and democratic learning initiatives at the AAC&U, Caryn Musil suggests, “This more expansive delineation of what civic learning and democratic engagement entail opens the door wide to every discipline. No longer is civic learning restricted to political science, history, or communication. Nor can any of those disciplines complacently prepare students for a 21st century world using 20th century conceptual disciplinary frameworks”.

One new field in which a potent contemporary form of civics education is developing includes Sustainability Studies, Sustainability Science, and other variations, such as Sustainable Development. Nearly 700 American college and university leaders have signed a climate commitment agreeing to make sustainability a part of the educational experience of all their students. While only three sustainability-related programs were added to U.S. colleges and universities in 2005, 66 were reported in 2008, and over 100 new programs in sustainability were added by 2009. More recently, Vincent et al.’s (2013) study for the National Council for Science and the Environment identified 1,151 programs at 838 institutions. As of December 2015, the Association for the Advancement of Sustainability in Higher


62 Vincent Bunn and Sloan, Curriculum Design.
Education (AASHE) maintains a list of over 1400 sustainability-focused academic programs in US states and Canadian provinces.

With very few exceptions, sustainability education programs align with the democratic, pluralist, social justice commitments of civics education, broadly conceived. Effectively, both foster the development of the skills and capabilities required for active participation in democratic societies within an interdependent, globalized world.\textsuperscript{63} Indeed, there is good reason to argue that sustainability education constitutes one of the most promising fields for the further development and practice of the new civics. Unencumbered by the path dependency of the traditional liberal arts disciplines, developed in and for the same interdependent world that gestated the new civics, and grounded in an explicit mission to empower students with the skills required to critically assess and cooperatively sustain and better this world, sustainability education appears to be optimally situated.

The international rise of sustainability education is charted in a range of declarations and national conventions, including the Tbilisi Declaration (1977), the Brundtland Commission’s report, \textit{Our Common Future} (1987), the Rio conference’s \textit{Agenda 21} (1992), and the United Nations Declaration of the Decade of Education for Sustainable Development (DESD 2005 - 2015). While sustainability is widely embraced as a value, its meaning remains ambiguous and essentially contested.\textsuperscript{64} I largely adopt

\textsuperscript{63} The next section on skills frameworks outlines these common commitments

Thiele’s definition of sustainability as “an adaptive art wedded to science in service to ethical vision. It entails satisfying current needs without sacrificing future well-being through the balanced pursuit of ecological health, economic welfare, social empowerment, and cultural creativity. In short, sustainability is the enduring and expansive integration of environmental, social, economic and cultural wellbeing.”

Thiele’s understanding benefits from his training as a political theorist and recognition of important roles for social empowerment and cultural creativity in the formation and maintenance of democratic societies. Thus, sustainability involves a range of social, scientific, and political processes, applied to complex situations, which are navigated with a combination of critical systems thinking and transdisciplinary communication and collaborative decision-making.

Like Thiele, this dissertation employs the concept of empowerment to describe a broad range of positive outcomes of sustainability education, which is crucial to the question of whether or not sustainability is fulfilling something like Dewey’s democratic education. Sustainability is commonly described as a balancing of environmental, economic, and social interests. Thus, sustainability often involves attempts to achieve


66 Regarding the social and political basis of sustainability: “Ultimately, sustainable development and sustainability itself are about collective values and related choices and are therefore a political issue, almost certainly the supreme global political issue of this century. Because values, politics, and our understanding of the Earth and its systems will evolve, notions of what is sustainable will never be static” Thomas Prugh and Erik Assadourian, “What Is Sustainability, Anyway?” *World Watch Magazine*, October 2003.

67 Among the primary criticisms of sustainability, the sharpest may be the tendency of supposedly sustainable endeavors to look a lot like “business as usual.” It can be easily harnessed by officials and state powers offering little more than lip service to environmental values (John S. Dryzek, *The Politics of the Earth: Environmental Discourses*, 2nd ed. (Oxford University Press, USA, 1997) p.151). The 2009 UNESCO conference in Bonn on education for sustainable development was criticized for ignoring economic and political realities, and for being “long on generalities and short on specific environmental policies” (John Huckle, “ESD and the Current Crisis of Capitalism: Teaching Beyond Green New Deals,”
an integrated sustainable solution that maintains the environment and builds the economy by improving social capital and enabling more participatory governance.\textsuperscript{68}

Empowerment as an outcome of development or education plays out in the social sphere of sustainability, which is too often neglected. The ideal balance of these three “spheres” of sustainability is commonly depicted as a Venn diagram\textsuperscript{69}:


According to meta research from a range of sustainability literatures, the social sphere of sustainability remains under theorized, oversimplified, and hard to measure. Much of the literature on sustainability education over the last two decades has been concerned with managing the physical systems of campuses, which is to say, sustainable built environments, and relatively little has been written on the pedagogical consequences of the shift to sustainability.

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71 Tarrant and Thiele, *Practice*, report: “Wals’ content analysis of the International Journal of Sustainability in Higher Education demonstrates that the publication’s first nine years (2001-2010) were largely devoted to what is commonly called greening the campus or reducing a university’s ecological footprint. The Association for the Advancement of Sustainability in Higher Education’s content analysis of its own publications further confirms the past decade’s emphasis on infrastructure and administration. They report on 1,777 publications, 71 per cent of which were news stories. Of these stories, 54 per cent concerned campus operations, 28 per cent focused on administration and finance and a strikingly low 18 per cent involved actual education, research or student engagement (AASHE, 2012). Only a small portion of these studies focused on the pedagogy of skills development.”
Definitions of social sustainability include a) safeguarding the functionality of communities, b) just, equitable and inclusive democratic societies, c) the orderly progress of society, d) development and/or growth compatible with the harmonious evolution of civil society, e) equitable distribution of income and access to resources and social services, f) life-enhancing conditions within communities and the process by which communities achieve this condition, and g) formal and informal processes contributing to current and future communities’ capacity for a good quality of life.\(^72\)

Harris and Goodwin (2001) define social sustainability as a system that achieves “fairness in distribution and opportunity, adequate provision of social services, including health and education, gender equity, and political accountability and participation.”\(^73\)

Dillard, Dujon and King (2009) offer a working definition of the social sphere that includes a) the processes that generate social health and well-being now and in the future, and b) those social institutions that facilitate environmental and economic sustainability now and for the future.\(^74\)

What is evidently lacking from these conceptions of the social sphere of sustainability is an adequate conceptualization of what is meant by empowerment, and an ability to discern between types of empowering practices, since all educational efforts do not have an equal impact on social justice and sustainability.

Sustainability is, at least conceptually, committed to social justice. To distinguish the type of education for sustainability that this research is normatively committed to

\(^72\) These definitions are reviewed in Joachim Spangenberg, “Economic Sustainability of the Economy,” *International Journal of Sustainable Development* 8, no. 1/2 (2005)

\(^73\) Dillard et al., *Social.*

\(^74\) Ibid., 4
improving, this section presents an argument for the social sphere of sustainability as inclusive of an empowering education for democratic citizenship. To illustrate what is meant by this empowering education, examples are taken from a range of literatures. These examples provide important descriptive context and contribute to a vision of learning outcomes. They set the stage for the review of sustainability learning frameworks that follows, in order to better distinguish between the economic goals of development – which are often understood as the achievement of justice in the distribution of benefits and burdens— and a social-political conception of justice — broadly understood as those participatory and educational processes that empower adaptive learners and enable collective flourishing.

Political theorist Andrew Dobson conducted an extensive analysis of social justice as concerning the distribution of benefits and burdens, and in relation to environmental sustainability. Dobson wanted to give instrumental weight to deontological arguments for justice. But in two years of research he found little empirical evidence supporting the claim that social justice is a precondition for environmental sustainability. But Dobson’s focus on distributive justice leaves unanswered the question of whether such empirics might exist regarding the achievement of non-distributive justice.75

David Schlosberg was one of the first political theorists to consider the impact of non-distributive theories of justice within the environmental and sustainability literatures. He explains:

The problem that I see is not that distributive theories of justice cannot be applied to environmental justice. Rather, the issue is that justice theory has developed a number of additional ways to understand the processes of justice and injustice...Authors such as Iris Young, Nancy Fraser, and Axel Honneth argue that while justice must be concerned with classic issues of distribution, it must also address the processes that construct maldistribution...Amartya Sen and Martha Nussbaum have developed a theory of justice that focuses on the capacities necessary for individuals to fully function in their chosen lives. The focus is not just on the distribution of goods, but also more particularly on how those goods are transformed into the flourishing of individuals and communities....[A] thorough understanding and approach to justice requires us to see the linkages between distribution, recognition, capabilities, and participation.76

Following Schlosberg, I would argue that many if not most of the critiques issued against sustainability are criticisms of distributive attempts to achieve social justice as a form of economic justice. The economic lens pervades both environmental and social concerns in many sustainability discourses, such that the social sphere of sustainability is limited to the distribution of benefits and burdens and the environmental sphere is limited to the management of resources. Recognition of the primacy of the economic lens in much sustainability discourse makes all the more apparent the importance of clearly articulated and defended conceptions of the social sphere of sustainability as concerned with the achievement of social justice through empowerment.

But empowerment is as ambiguous and contested a term as justice or sustainability. There is good reason to question the ethics of participatory development work where the language of empowerment masks a real concern for managerial effectiveness.77 Many are critical of the use of empowerment as a mere rhetorical


device, a term that confers legitimacy to development agencies prior to action:

“International development organizations may appear to have appropriated concepts once used by radical alternative movements, but they have not necessarily swallowed them whole.” Joshi and Fawsett (2001) suggest empowerment is too often an ambiguous substitute for participation. In such cases citizens participate in the process, but are not given the means to affect the process. It remains vital to ask, *Empowerment to what end?* Answering the question with recourse to case study research in the international development literature helps to answer the question of what empowerment means for sustainability education and the social sphere of sustainability.

Empowerment is widely presented as a means to economic, environmental, and social ends. Eyben, Kabeer, and Cornwall (2008) focus on empowerment as a path rather than a building – a means rather than an end. Similarly, “deepening democracy” approaches to empowerment focus on substantive citizen participation, including participatory budgeting, civil society building, and deliberative democratic institutions such as citizens’ juries.

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79 A table of definitions of empowerment from the literature is included in the appendix The World Wildlife Federation, The World Bank, and the United Nations all have explicit development goals based on empowerment. It is an important term in a motley field of inquiries, including feminist, Christian right, new-age self-help, political, pedagogical, and business management literatures (Cornwall and Brock 2005); Within international development literatures exists an array of definitions: some focus on challenging oppression and human rights violations (Oxfam 1995); others the focus on expanding opportunities and assets related to making choices (Kabeer 2001; Appleyard 2002; Alsop 2006); others the focus on expanding abilities to influence state institutions (WDR 2000/2001); others the focus on taking control of one’s life (Strandburg 2001; Chambers 1993); others the focus on development and education for social mobilization and collective action (Craig & Mayo 1995; Bennet 2002); and still others take a general focus on changes in power relations within society, within the state, and between the state and society (Most of these definitions are part of a larger comparison conducted in Ibrahim and Alkire 2007).

80 Rosalind Eyben, Naila Kabber, and Andrea Cornwall, “Conceptualizing Empowerment and the Implications for Pro Poor Growth” (GSDRC, 2008).
be a moving target and a messy process, which resists analyses grounded in short causal chains and controllable variables. These same challenges are associated with analyses of empowerment in the classroom.\textsuperscript{81} Alsop and Heinson (2005) measure degrees of empowerment based on whether a choice exists, whether a person actively makes a choice, and whether the choice achieves the desired result.\textsuperscript{82} This definition of empowerment is relevant for the investigation of autonomy and sustainability conducted in chapter 5 of the dissertation.

John Gaventa’s work on empowerment, participation, and citizen engagement highlights the difference between top-down empowerment strategies, and bottom-up locally instigated practices for empowering and collective action. Gaventa and Barrett’s 2010 report is an extensive study of empirical work related to empowerment, aggregating hundreds of case studies between 2003 and 2010, and resulting in a case study summary involving 100 different situations of empowering civic engagement in 20 different countries, and their significant outcomes.\textsuperscript{83} They mapped the effects of citizenship participation and created a typology of four democratic and development outcomes: (a) the construction of citizenship, (b) the strengthening of practices of participation, (c) the strengthening of responsive and accountable states, and (d) the development of inclusive and cohesive societies. Importantly, Gaventa and Barrett’s work links empowerment with an individual’s ability to participate in and support the

\textsuperscript{81}These challenges and the chosen method are discussed in detail in the methods chapter.

\textsuperscript{82}They further specify subdomains of the state as justice, politics, and service delivery; of the market as credit, labor, and goods; and of the society as family and community.

reformation of a democratic society. Similarly, this dissertation follows Dewey’s linkage between the empowered individual and a flourishing democracy.

Gaventa’s emphasis on a bottom up power dynamic in development scenarios is mirrored in sustainability education’s emphasis on student-driven projects, and an overall orientation toward transdisciplinary processes, where power is more equitably shared and more diverse forms of knowledge are considered. Gaventa and Barrett’s research found a significant difference in the success of participatory and empowering practices that build from local associations and neighborhood interests, to claim a space in decision-making or access newly offered spaces for decision-making; and those empowering practices and strategies that were implemented top-down by donor organizations with pre-determined development outcomes. Local associations were twice as likely of contributing to positive outcomes as the other three forms of civic engagement. A similar lesson is reported in chapter 6 of the dissertation, comparing differences in student blogs where students framed the discussion, versus blogs where the teacher framed the discussion.

In summary, the dissertation draws similarities between empowerment in the context of development, and empowerment in the context of sustainability education in American colleges and universities, to better articulate the social sphere of sustainability, as consisting of activities for the empowerment of democratic citizens in ecologically informed societies. Most evident in the comparison is the fact that students

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84 And almost half of the formal “top-down” participatory governance spaces for engagement and empowerment had negative outcomes. Negative consequences involved situations where “participatory action is seen as merely ‘cosmetic’, decorative, meaningless, or a ‘waste of time’. In other cases, participatory action may be seen as ‘manufactured’ or ‘captured’ from above by politicians, parties, NGOs or other elites seeking to use it for their own ends...In such instances, action may risk reinforcing a sense of disempowerment and contributing to people’s reluctance to engage in the future.” Ibid., 50.
who will be prepared to take ownership must be given some ownership, students who
will be prepared to engage in collaborative decision making must be given practice in
this art, and students who will have to understand at least the basic interdependencies
of complex socio-ecological models, must be given practice in studying these systems.
Lastly, according to this empowerment literature, the new participating democratic
citizen is empowered in learning experiences that provide authentic practice in real
world situations, in a community of learners.

John Dewey described pragmatism as responding to “an inner demand for an
intellectual technique that would be consistent and yet capable of flexible adaptation to
the concrete diversity of experienced things.” Empowerment functions to prepare
students for negotiating change while maintaining important values and traditions.
Dewey stressed that all the world was in a constant state of change. His notion of a
dynamic world, coupled with his pragmatic method of adaptive learning, anticipates
important skills for empowered citizenship practice. Dewey’s vision is confirmed in
contemporary political science literature. For example, theorizing on discourses of
environmental sustainability, political scientist John Dryzek (1987) outlines “the inherent
shortcomings of conventional conceptions of problem solving under extreme
complexity.” Contemporary ecological issues are among the most complex, requiring
new decision-making processes. Where traditional expertise can fetter the deliberative
process of surmising the conditions and planning the management of human-ecological

85 Hickman and Alexander, Vo/l,16.
86 Ibid., 24.
relationships within a locale, adaptive expertise is especially adept at cultivating openness and sensitivity to change within a learning environment.  

Adaptive expertise begins with an education in the skills that enable adaptive learning. To practice these skills is to be empowered for participation in a complex, interconnected world. Lastly, the concept of empowerment highlights that the ultimate end of Dewey’s vision of democratic education is not merely the integration of scientific, technical, and liberal education. Rather, this integration of knowledge forms is the means by which he suggests society can work toward the end of achieving an empowered citizenry of socially adept individuals, capable of freedom.  

The Skills Framework  

This research is concerned primarily with recent approaches to teaching and learning within sustainability education that posit learning goals based on the gaining of a specific set of skills, in addition to a specific body of knowledge. A number of existing frameworks for sustainability education have contributed to the approach to skills-based education taken up in the dissertation. Foremost among these is the scholarship associated with the United Nations Decade of Education for Sustainable Development (UNDESD). Within this literature, Donella Tillbury (2011) summarizes sustainability skills in her review of case studies to include a) learning to ask critical questions, b) learning to clarify one’s own values, c) learning to envision more positive and sustainable futures, d) learning to think systematically, e) learning to respond

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through applied learning, and e) learning to explore the dialectic between tradition and innovation.\textsuperscript{91} Arjen Wals (2012), professor and UNESCO chair in social learning and sustainable development, tasks education with the mandate of enabling “citizens around the globe to deal with the complexities, controversies and inequities arising from issues relevant to the environment, natural heritage, culture, society and economy.”\textsuperscript{92} He identifies four distinguishing lenses for this type of education: a) an integrative lens that allows for a holistic perspective, b) a critical lens that questions taken-for-granted patterns, c) a transformative lens that moves from simple awareness raising to empowering change, and d) a contextual lens that embeds the values of pluralism in learning.\textsuperscript{93}

Alongside the literature associated with the DESD, a number of important reviews of sustainability education have in common an approach based upon the idea of sustainability competencies.\textsuperscript{94} Wiek, Withycombe, and Redman (2011) developed the competencies approach as a guiding framework for the sustainability degree programs in Arizona State University’s School of Sustainability. Within the competencies


\textsuperscript{93} These frameworks are reviewed in relation to John Dewey’s pedagogy in Tarrant and Thiele, \textit{Pedagogy}, 2016.

framework is an emphasis on systems thinking, interpersonal skills, problem solving and project management.95

The National Center for Science and the Environment (NCSE) framework was based on opinion surveys of program directors in environmental and sustainability degree programs. Along with the skills already mentioned, the NCSE framework also includes skills for science, such as data management, field and lab research, and technical writing.96 Most recently, an extensive collaboration among international experts was completed in Australia in 2015, called “The Learning and Teaching Academic Standards Statement for Environment and Sustainability.”97 The Australian framework is based on “threshold learning outcomes” in four areas: transdisciplinary knowledge, systemic understanding, skills for environment and sustainability, and

95 The Wiek, Withycombe, Redman framework includes:

**Systems thinking competence** – the ability to collectively analyze complex systems across different domains (society, environment, economy, etc.) and across different scales (local to global), thereby considering cascading effects, inertia, feedback loops and other systemic features related to sustainability issues and sustainability problem-solving frameworks

**Anticipatory competence** - the ability to collectively analyze, evaluate, and craft rich “pictures” of the future related to sustainability issues and sustainability problem-solving frameworks.

**Normative competence** – addressing questions of how social-ecological systems ought to be developed, so that they balance and even enhance socio economic activities and environmental capacities

**Strategic competence** - being able to “get things done”. This involves familiarity with real-world situations and relationships, political understanding, challenging positions at the right time, being able to solve logistical problems, using language that non-academics are comfortable with, working with deadlines that governments insist on, and so forth.

**Interpersonal competence** - the ability to motivate, enable, and facilitate collaborative and participatory sustainability research and problem solving (2011)

96 Vincent et al., *Curriculum.*

97 Phelan et al., *Learning*
ethical practice. All of these frameworks recognize a role for ethics and normative deliberation, alongside skills in communication and critical and systems thinking.

To a certain degree, the development of sustainability education is characterized by attributes that are common to a range of 21st century learning initiatives. For instance, UNICEF (2013) outlines specific life skills for human rights and social justice, including critical thinking, decision making, interpersonal relationship skills and communication skills. Similar to much discourse in sustainability, the UNICEF framework conveys a sense of urgency for the achievement of these skills. The skills are not themselves newly relevant to human development. What is new is the speed at which we are required to attain knowledge and skills, and the diversity of domains within which this knowledge and these skills pertain. "[T]he pervasive spread of digital technologies" has fundamentally altered the nature and speed by which we communicate and exchange information.98 The UNICEF framework, like the sustainability frameworks, emphasizes the ability to proactively assess and address unanticipated problems, arguing that the ultimate expression of life skills learning is adaptive and positive behavior, greatly influenced by the environment in which individuals live, learn, and act.99

Likewise, a recent report from the National Academy of Sciences notes a growing workplace demand for broad capacities including: creative problem solving, complex communication and team-building skills, adaptability, self-management, self-


development, and systems thinking. Add to this the fact that sustainability is becoming a mainstream and employable skillset. For instance, a survey of more than 1300 business professionals reported that 85% viewed sustainability knowledge as valuable and 78% believed it would be still more important in the next five years. Also, it is estimated that over half of currently enrolled college students will have careers that are not yet invented. Adaptation, communication, flexibility, learning-by-doing, and safe-to-fail experimentation are key skills to the economic viability of future businesses, along with being foremost skills for managing healthy ecosystems, and maintaining a commitment to democracy and social justice.

Lastly, sustainability learning frameworks share much in common with prominent frameworks for 21st century civics education. The Center for Engaged Democracy (CED) (2013) produced a report including a similar emphasis on problem solving and project management skills, and interpersonal skills development. CED’s framework differed from the sustainability frameworks in that there was no mention of systems thinking or transdisciplinarity, and also there was a whole section on civic knowledge. Civic Prompts (2015), a recently published guide from the Association of American Colleges and Universities (AACU), begins from the premise that there is a potential civic component to a great many different academic disciplines. Civics education that

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100 Hilton, Future.


103 This dissertation deals with skills development, and does not address knowledge acquisition. I am arguing that skills development is a necessary but not sufficient component of sustainability education.
embraces its own interdisciplinary potential fits even more neatly into education for sustainability.

Learning frameworks were synthesized by Tarrant and Thiele (2016) into a summative two-part skills framework for sustainability education, which served as the guiding skills framework for the dissertation:

<table>
<thead>
<tr>
<th>A Framework for Sustainability Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Systems Thinking</td>
</tr>
<tr>
<td>The ability to assess the accuracy, relevance, and reliability of different types and sources of information and evidence</td>
</tr>
<tr>
<td>The ability to evaluate the clarity, consistency, and credibility of claims and arguments and the stated or unstated assumptions or convictions upon which they rest</td>
</tr>
<tr>
<td>The disposition of ongoing creative and curious interaction with information, evidence, and perspectives</td>
</tr>
</tbody>
</table>

Figure 1-2. Sustainability Skills Framework

The two part skills framework of critical systems thinking and transdisciplinary communication and collaboration is well aligned with Dewey’s integrated vision of new democratic education. The following chapters illustrate how systems thinking is becoming integrated into the critical thinking skill set, and how transdisciplinary approaches to collaboration and communication are shaping experiential learning.

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104 Sustainability education has been defined as "a transformative approach that sees learners develop skills and competencies for partnership, participation and action’. It is an approach in education that ‘encourages individuals to develop skills to critically enquire and systematically think about problems in ways that allow them to explore the associated complexity, and the implications for a more sustainable way of being’ Sarah Holdsworth et al., “Professional Development for Education for Sustainability: How Advanced Are Australian Universities?,” *International Journal of Sustainability in Higher Education* 9, no. 2 (April 11, 2008), 133.
opportunities within sustainability education programs. Here is offered a brief summary of this development, before moving on to abstracts for the remaining chapters of the dissertation.

Critical systems thinking is founded on the hallmarks of critical thinking; namely, the interrogation of conceptual and normative foundations, assumptions, and implications of different arguments, perspectives, and actions. This foundation is extended in critical systems thinking by application within an ecological framework, which allows for the understanding of complex adaptive systems and potentially the coordination of a diversity of knowledge forms. It allows for self-reflectively analyzing the mental models that guide beliefs and assumptions about systems and their component parts, and it promotes engaging in analytical exercises that relate the parts to the whole. Systems thinking is a key addition to the traditional skill set of citizenship given the new civic context of an ecologically, socially, and economically interdependent world.

Transdisciplinary communication and collaboration must be understood first in distinction to multidisciplinary or interdisciplinary communication and collaboration. Multidisciplinarity involves different disciplinary experts working alongside each other, but not necessarily integrating what they know into a single holistic strategy. For example, producing a cell phone is a multidisciplinary affair – each expert has their own problem, and their own expertise, and rarely do any of these experts need experts from another realm to achieve their part of the larger puzzle. Interdisciplinary communication

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105 Tarrant and Thiele found that systems thinking and transdisciplinary learning opportunities, along with a greater emphasis on experiential learning, were what differentiated sustainability education programs from related programs in environmental politics Seaton Tarrant and Leslie Paul Thiele, “The Contribution of Sustainability Education to Environmental Political Theory,” in The Oxford Handbook of Environmental Political Theory, ed. Teena Gabrielson et al. (Oxford University Press, 2016).
and collaboration is based on a need to integrate knowledge forms in response to specific problems. For example, if there is a sudden drop in bird populations in the barrier islands that protect a certain cost, a range of specialists will collaborate on the work that tries to identify the cause of this shift, including marine biologists, ornithologists, and wetland ecologists. Transdisciplinary communication and collaboration works to address specific problems, just like interdisciplinary communication and collaboration, but transdisciplinary communication and collaboration includes non-traditional expertise and other types of stakeholders. For example, in the problem of the sudden drop in bird populations, it might be discovered that a shift in microfauna of the waters has led to decreases in crustaceans, and in fish, and so birds are going elsewhere. Scientists would put an embargo on fishing in these areas until the problem was resolved, except local fisherman depend on this resource for their livelihood. The inclusion of local fisherman, as well as other environmental activists, tourism businesses, and even families who for generations have camped on the barrier islands, denotes the shift to transdisciplinary communication and collaboration. Transdisciplinary processes break down not just disciplinary silos, but the very walls of the ivory tower. The skills associated with critical systems thinking and transdisciplinary communication and collaboration have been identified by experts in the


field of sustainability education as vital to existing and emerging sustainability professionals.\textsuperscript{108}

**Chapter Outline**

Chapter 2 explains the methods and methodology of the dissertation, which is based on an application of phronetic social science and action research to the topic of sustainability education. The chapter links this method with Deweyan philosophy of learning, and explains the iterative, mixed methods approach that was taken to understand and describe potential manifestations of Deweyan democratic education within sustainability education.

Chapter 3 comprises the introductory chapter to the *Thinking* section of the dissertation, which is focused on critical systems thinking. The chapter deploys Dewey’s interpretation of historical pedagogical figures, Plato and Rousseau, to illustrate key connections between Dewey’s democratic education and contemporary efforts to educate citizens capable of navigating the social and ecological complexity of the 21\textsuperscript{st} century.

Chapter 4 offers an empirical analysis of critical systems thinking in sustainability education. Following a review of the prevalence of critical systems thinking in sustainability education, the chapter deploys educational researcher Girt Biesta’s framework of socialization and subjectification to discern some of the political

\textsuperscript{108} The ISSP (International Society of Sustainability Professionals), for example, has surveyed professionals working in sustainability to identify these and there are other reports such as the ECO Canada Competencies for Environmental Professionals in Canada, and more general reports such as the National Academies report “Education for Life and Work: Developing Transferable Knowledge and Skills in the 21\textsuperscript{st} Century”.

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implications of critical systems thinking education and its potential as an empowering form of education for democratic citizenship.

Chapter 5 introduces the *Doing* section of the dissertation, which is concerned with transdisciplinary communication and collaboration. The chapter engages with environmental political theory to discern the characteristics of ecologically informed citizenship in liberal democracies. The theory is supported by recourse to Dewey’s pedagogical concepts of continuity and interaction.

Chapter 6 is an empirical analysis of transdisciplinary communication skills development in sustainability education. General prevalence of transdisciplinary and non-transdisciplinary communication skills practice is reported. The analysis revealed a distinction between the integration of science and communication at the program level, and the integration of science and communication within actual courses. Consequences for the potential of Dewey’s integrated vision, laid out in “The Democratic Faith and Education,” are discussed.

Chapter 7 is an empirical analysis of transdisciplinary collaboration in sustainability education. An overview of the prevalence of collaborative practices in sustainability degree programs is provided. Two cases from interviews with sustainability educators are provided as evidence of the potential integration of scientific and liberal learning, much as Dewey envisioned nearly a century ago.

Chapter 8 concludes the dissertation by recapping the primary findings of the research. Limitations to the dissertation are discussed, along with a selection of possible avenues for future research, including research on intuitional constraints to the further development and practice of sustainability education, extending the analysis into
non-formal sustainability education settings, and the social-emotional role of empowering educational practices for sustainability, encapsulated in the notion of hope.
CHAPTER 2
METHOD AND METHODOLOGY

Introduction

This research was conducted as a work of phronetic social science, utilizing mixed methods action research. Employing a descriptive conceptual framework of learning skills and dispositions, the research explores and describes characteristics of the relatively new and advancing field of sustainability in American higher education institutions, and the relation of this field to the achievement of a Deweyan education for democratic citizenship. Adopting Flyvbjerg’s approach to phronetic social science, the research included a sensitivity to the workings of power within higher education.

The methods chapter is divided into two parts. The first part provides the methodological justification for the chosen approach through recourse to pragmatic educational research, phronetic social science, and the sustainability education literature. The second part details the research method as it unfolded iteratively during the four years of investigation.

Methodological Justification for Mixed Methods

If John Dewey is the primary political theorist that guides the substantive focus of this research, Gert Biesta is the primary philosopher of education that guides its methodology. Biesta has in numerous works identified connections between Dewey’s pragmatism and a mixed methods approach to social research.¹ Dewey’s pragmatism is in many ways about overcoming dualisms. The consequences for Dewey’s synthetic

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approach extend into social research and support the application of mixed methods.\textsuperscript{2} Dewey's pragmatic philosophy helps "to break down alleged epistemological hierarchies between the different methods and methodologies that make up mixed methods approaches."\textsuperscript{3} But pragmatism is not in the business of providing wholesale philosophical justifications. Rather, pragmatism is a set of tools that can be put in service to specific problems. In Deweyan fashion, Biesta has moved the conversation away from dualisms such as qualitative versus quantitative research. Much of the trouble associated with mixed methods involves dualisms, such as "epistemological questions about the objectivity or subjectivity of knowledge and ontological questions about causality and the specific nature of social phenomena."\textsuperscript{4} Biesta, instead, suggests that methodological considerations, including the choice to employ mixed methods, should be based on a consideration of the purpose of the research.\textsuperscript{5} Biesta's perspective on method is informed by his subtle understanding of teaching and learning. He writes, "when teaching and learning are connected, it is because those who learn have, in some way, interpreted and made sense of the teaching. The link between teaching and learning is thus established through \textit{interpretation}."\textsuperscript{6} Locating and understanding the learning potential of a given educational moment is itself an

\textsuperscript{2} David L. Morgan, "Pragmatism as a Paradigm for Social Research," \textit{Qualitative Inquiry} 20, no. 8 (October 1, 2014): 1045–53.

\textsuperscript{3} Osberg and Biesta, \textit{Complexity}, 96.

\textsuperscript{4} Ibid., 103.

\textsuperscript{5} This perspective is germane to the literature on qualitative research: "characterized by extended participation and a methodological pragmatism oriented towards adapting methods to the field and using whatever methods lead to more insights." Uwe Flick, \textit{An Introduction to Qualitative Research}, 4th edition (Los Angeles: SAGE Publications Ltd, 2009), 236.

\textsuperscript{6} Ibid.
interpretive act. Mixed methods allow for a range of interpretive possibilities, and are well suited to education research.

In a 2011 survey of researchers in sustainability education, Reunamo and Pipere found that 30 percent of researchers in the sustainability education field employed mixed methods.\textsuperscript{7} They report that the traditional distinction between quantitative and qualitative research is limited in its applicability to learning, which is an emergent and highly unpredictable affair. Research into learning does not easily establish strong causal connections. The emergent aspect of learning requires a bit of faith, in the Deweyan sense, which is to say, educators have to design openness into their pedagogy, and this is true also of any research into educational practice, so that the emergent, interpretive aspects of learning might occur.

The emergent and interpretive aspects of researching, teaching, and learning are the adaptive processes that Dewey likewise identified as the root of the educative act. In keeping with this understanding, the methods of the dissertation were adapted as the questions developed.\textsuperscript{8} Regarding the use of frequencies, the research should be understood as descriptive, interpretive and meaning-generating. Simple frequencies and cross tabulations of frequencies with institutional and programmatic variables are employed in order to develop a more complex and multilayered description of


\textsuperscript{8} “Different kinds of data give the analyst different views or vantage points from which to understand a category and to develop its properties; these different views we have called slices of data. While the sociologist may use one technique of data collection primarily, theoretical sampling for saturation of a category allows a multi-faceted investigation, in which there are no limits to the techniques of data collection.” Barney Glaser and Anselm Strauss, \textit{The Discovery of Grounded Theory: Strategies for Qualitative Research} (New Brunswick: Aldine Transaction, 1967), 65.
sustainability education and its relationship to contemporary citizenship education, not to attempt a weak form of statistical inference. It does this with a focus on the larger social problems it means to address, and with a sensitivity to the varied functions of power in proposed solutions. A solutions-orientation and a sensitivity to power are the focus of the two other important methodological connections in this research: action research and phronetic social science.

**Action Research**

Methodologically, the heart of action research is a process that alternates between action and critical reflection. The historical lineage of the method can be traced to Dewey’s adaptation of Aristotelian empiricism in the first part of the twentieth century, Kurt Lewin’s work in the 1940s while director of MIT’s Research center for Group Dynamics, and then again by David Kolb and Richard Fry in the 1970s. Most recently, action research is defined as “a participatory, democratic process concerned with developing practical knowledge in the pursuit of worthwhile human purposes...it brings together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally, the flourishing of individual persons and their communities.” Action research is very often a political process, “constituted by and constitutive of the values and principles of the democratic form of social life it seeks to foster and achieve.”

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Action research is a worthy framework for researchers who hold normative democratic commitments for the inclusion of diverse perspectives and voices, and stress that consensus should not be achieved at the cost of silencing those who are most impacted. A focus on “the flourishing of individual persons and their communities” is an important tie to the larger discourse and practice of sustainability education as well, which maintains varying levels of commitment to social justice. Action research has been identified as a viable research strategy for engagement with complex social phenomena.12

**Phronetic Social Science**

As a form of action research, this research follow’s Bent Flyvbjerg’s focus on practical wisdom as an approach to problem-driven social science. Action Research is about responding to specific problems, and so falls under the social science category of problem-based research. Building off of Carr’s work, Elliot (2009) argues for educational action research as a form of practical philosophy. This is what social scientist Bent Flyvbjerg calls phronesis (2001). Flyvbjerg began his exposition of phronesis by celebrating the specific contributions of the social sciences, distinct from natural science. He argued that the goal in such work was less to contribute predictive and explanatory theory, and more about “reflexive analysis and discussion of values and interests, which is the prerequisite for enlightened political, economic, and cultural developments in any society.”13 The description of phronetic social science had

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13 Reason and Bradbury Handbook, 3.
changed by the time of publication of the collected volume *Applied Phronesis* (2012), which Flyvbjerg co-edited with Todd Landman and Sanford Schram. Here the theoretical developments that began a decade earlier had developed into *a collection of methods* for practical application. Schram writes, “Phronetic social science puts the emphasis not on particular research methods or types of data, but on producing research that can enhance phronesis by increasing understanding in specific contexts…Phronetic social science, therefore, is centrally about producing research that has relevance to decisions about what can and should be done, and also how to do it. It differs from either philosophical or scientific knowledge…[because] it is not just about what is true, but also about what it would be good to do in given circumstances. It differs from technical knowledge in that it is concerned with evaluating and prescribing goals as well as with selecting means.”  

Schram goes on to explain that phronetic social science is engaged with situations “in a way that is designed to empower change. In this it shares some features in common with various forms of action and participatory research.”  

In summary, there appears to have been a development since Flyvbjerg first explained phronetic social science in his 2001 defense of the social sciences. In the first book, Flyvbjerg is careful to distinguish that phronetic researchers are closely connected with reactions and developments in the surroundings that compose their study, but without “going native or the project simply becoming action research.”

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15 Ibid., 20.

By the 2012 volume, the concluding chapter summarizes, “Aristotle’s definition of phronesis as reason capable of action means phronetic research results are results only to the extent they have an impact on practice.”\textsuperscript{17} By 2012 there is a move away from emphasizing a specific method, and instead pointing to a situated strategy, a rooting in context, and it is aligned all the more with action research, following John Elliot’s (1991) claim, “The fundamental aim of action research is to improve practice rather than produce knowledge. The production and utilization of knowledge is subordinate to, and conditioned by, this fundamental aim.”\textsuperscript{18} Or, put less dramatically, action research bears “the double burden of testing hypotheses and effecting some (putatively) desired change in the situation.”\textsuperscript{19}

Despite an increased emphasis on the part of phronetic social scientists regarding the practical application of their research, the current study would only be action research if it did not also focus on power, which is key to the phronetic method. A focus on power is achieved by scaling up from the minutia of situations to the larger structures that dictate and limit change opportunities.\textsuperscript{20} This research engages with power by investigating the indoctrinating tendencies of sustainability education, and through its consideration of the power of competence and capability, as a way of understanding the Deweyan vision of civics education, and its relation to empowerment.

\textsuperscript{17} Flyvbjerg, Landman, and Schram, \textit{Real Social Science}, 287.


And yet perhaps more than its emphasis on power, this research is aligned with phronetic social science through its focus on reflexive analysis that recognizes the explicit “situatedness” of the researcher. There are normative commitments to this research that mean to improve higher education, “to adjust organizational policies and institutional arrangements to make improvements…for enhancement of the overall quality of education.”

This interaction with the administrative structure and organizational culture of higher education occurs through an inclusive, reflexive, adaptive learning process:

The ultimate goal is practical outcomes based on these relationships with the community, in my case, the community of learners, including educators and students. Respect for the knowledge and experience of community partners and a genuine commitment to addressing critical social problems as they are defined by members of the community themselves. This research must engage community members as equal partners and must result in practical outcomes that address these problems in concrete and sustainable ways.

Simmon’s (2012) adaptation of Flyvbjerg’s work, what he calls “anti-hegemonic phronetics”, is based on an emphasis on social justice in higher education. Simmons says the educational manifestations of action research are mostly just applied social research - teachers conducting research on their own classrooms to improve their educational practices. He celebrates the more engaged forms where communities work collectively to improve their situations. In its incorporation of student opinions and educator interviewers, this research attempts to achieve something like Simmon’s

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vision, since it is not merely or even primarily drawing from, or acting upon the researcher’s own classroom, but rather organizing and sharing the beliefs and strategies of a community of practitioners, who share in common the interest to improve practice in sustainability education.

**The Normative Commitments of Researchers in Sustainability Education**

In their 2011 survey, Reunamo and Pipere identified the importance of the agentive nature of researchers in education for sustainability, since so many are deeply committed to shifting education toward specific ends. Thus, “do we think about the research as a means for exploring the environment as an existing entity or as a source of possible changes?” Of course, the obvious answer, is that one cannot well do the latter without considering the former. Still, the majority of surveyed researchers strongly agreed that the central reason for conducting research into education for sustainability is “the desire to contribute to societal development.” They found that the longer a researcher had been engaged with education for sustainability issues, the stronger their normative commitments to progressive social change. In other words, long-term commitment to the subject was revealed in the researcher’s explicit sense of agency, and “a specific case of this agency is action research where specific objectives, improvement and involvement are essential.”

Action research has at least since the 1990’s engaged in research and development in higher education. As with action research in general, educational action research is focused on practical outcomes and improved social and institutional

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24 Ibid., 119,120.
practices.\textsuperscript{25} As one education action researcher put it, “The implications for our action research projects would be that we would need to pay attention to how education realized in and through our own practices – whether as teachers, lecturers, health practitioners, community educators or activist-consultants – enhances the freedoms that allow children or students or parents or patients to form a wide capability set.” \textsuperscript{26} Thus, educators engaged in action research typically have a guiding practical interest and personal commitment that steers the research.

The role of the researcher in this dissertation necessitates the recognition of normative commitments to the improvement of sustainability education initiatives through the development of more holistic and integrated pedagogical practices. This normative commitment is presented in the dissertation as secondary to the primary research question regarding the extent and quality of sustainability education as a source of 21\textsuperscript{st} century Deweyan citizenship education. In keeping with Reunamo and Pipere’s findings, this research acknowledges its normative commitment to socially just and ecologically flourishing societies, and improvements to education that might support these larger societal goals.

**Method**

Sustainability education is a fairly new and rapidly advancing initiative in higher education. Researchers of sustainability education suggest that it has a role to fulfill in achieving civic competence, and sustainability education frameworks identify many of


the same skills that are associated with citizenship to be important learning outcomes. This research sets out to explore and understand if and how sustainability education degree programs in American colleges and universities are attempting to achieve a form of citizenship education in keeping with Dewey’s democratic education. Along with extensive literature reviews, the research draws on the expertise of educators in the field, the experiences of students in sustainability degree programs, and content analysis of syllabi and program descriptions.

The following explanation of methods is composed of three sections. The first section introduces the reader to the four primary data collection and analysis strategies employed in this research of sustainability in higher education. As a whole, these mixed methods strategies form a triangulated, descriptive investigation into characteristics of sustainability education, to understand the extent to which it can be understood as a form of 21st century Deweyan citizenship education. The second section provides overview information of sampling and data procedures, as well as ethical considerations of the data and validity measures. The third section provides some overview reporting of general characteristics of the sample of syllabi and program descriptions.

**Stages of Action Research**

The first phase of research occurred as participant observation while I was a graduate assistant in two iterations of a large introductory course in a sustainability studies degree granting program. Well known political and sociological studies have made use of participant observation to better understand civic and citizenship concerns.

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27 See the introductory chapter for references to this correlation between sustainability and civics. Further connections between these fields are made in the following chapters.
For example, civic life was the primary concern of Bellah et al.’s (1985) study of the private and public sphere in the USA, and that study made significant use of participant observation, interviews, and ethnographic data.\(^{28}\) I was well situated for participant observation, as a teaching assistant attending the course as an observer each session, and as a researcher that had previous experience with the method of participant observation, while completing a master’s degree on post-Katrina New Orleans (2010).

The second phase of the research involved a review and categorization of the sustainability education literature. The initial goal of this review was to identify frameworks, learning models, and pedagogy that were supportive of the sorts of social and experiential learning opportunities identified during the initial participant observation. Key themes discovered during this phase include a disparity of research on “the social sphere” of sustainability, and the commonality of skills within the sustainability literature and the literature on “new civics.”\(^{29}\)

The third phase of research, informed by the synthesis of learning frameworks and literature achieved in phase two, involved research into the prevalence of skills and outcomes in sustainability course designs and program descriptions, within degree granting programs in sustainability in the United States.

\(^{28}\) For other examples of qualitative political and sociological studies see Gianpaolo Baiocchi and Brian T. Connor, “The Ethnos in the Polis: Political Ethnography as a Mode of Inquiry,” Sociology Compass 2, no. 1 (January 1, 2008): 139–55.

\(^{29}\) “The New Civics initiative area invites research proposals that ask critical questions about how education can more effectively contribute to the civic development of young people. As a start, we ask what experiences, environments, and contexts help young people, from all walks of life, develop the habits, skills, understandings, and dispositions that encourage informed participation in civic affairs. In so doing we seek to connect to a tradition of civic education inside schools, both to reassert its legitimacy as a primary aim of public schooling, and to reimagine what civic education might include.” Spencer New Civics Initiative Program page, accessed at http://www.spencer.org/new-civics-program-statement on May 29 2016.
The fourth phase of research involved open-ended interviews with sustainability educators from a diverse range of universities and colleges. This phase of research contributed to the verifiability of the descriptive conclusions reached regarding sustainability education practices, which were derived from the content analysis of syllabi and program descriptions. Furthermore, this phase revealed characteristics of sustainability education not evident in syllabi and program descriptions, such as the institutional challenges associated with offering transdisciplinary and experiential learning opportunities, and anecdotal evidence of the Deweyan strategy of infusing occupational education with “genuinely liberal content.”

Overview of Sampling and Data Procedures

Initial insight into characteristics of sustainability education occurred following Patton’s (2002) sampling criteria of convenience. Student data were collected from undergraduate students in two different iterations of the sustainability studies introductory course, Facets of Sustainability, at the University of Florida. Student data included 126 student letters, in which students identify their own learning goals; 139 student pre-tests and 96 student post-tests, which assess basic orientation to the subject of sustainability, and student opinion of skills acquired; student-generated rich picture conceptual maps and student reflections on this project; Prezi online collaborative conceptual maps and student reflections on this project; and 337 student blog posts.

The initial review of the sustainability education literature included collection of some 136 sustainability education journal articles, major UNDESD reports, national learning frameworks and dissertations on sustainability education.
The sample of program descriptions were taken from the internet, based on the list of bachelors-level degree programs that included the word sustainable or sustainability, according to the Association for the Advancement of Sustainability in Higher Education’s list at that time (2013). Limiting the sample to programs that contain the words sustainable or sustainability was both helpful and a significant limitation of the research. Given the time and resource constraints of the project it was not realistic to attempt to identify and include relevant programs that did not include the sustainable moniker in their title, though many of these exist. Of the initial 90 sustainability degree granting programs with the word sustainable or sustainability that were identified, 11 were culled for being defunct, or overseas, resulting in 79 programs.

Purposive sampling was used to identify participants in the last phase of research, which involved open-ended interviews with sustainability educators from across the country. Purposive sampling is commonly used in qualitative research to select participants based on the needs of the study. The selection criteria for the interview participants was based on including a variety of leadership perspectives and practitioner experiences in sustainability education. Some were chosen because of their leadership in the field of sustainability education, others for their particular expertise in


31 One of the interviewees in the study explained that their program would have included the word sustainability in the title, except the state system in which they taught already had the course designations in place to develop courses under an environmental studies designation. Undoubtedly, there are a great many similar cases, and cases of environmental studies programs directly aligned with the type of education I analyzed in my collection of sustainability syllabi.

social justice education, online education, or experiential education. Twenty-two interviews with sustainability educators were conducted. Likewise, purposive sampling was used to conduct a focus group interview with four undergraduate students in a sustainability course that included an extensive community-based sustainability project.

Data Collection and Analysis

In the first phase student blogs and opinion surveys were analyzed, and it was discovered that students in the sustainability introductory course wanted more and better opportunities to interact with peers in social and experiential learning situations. This understanding led to an extensive review of sustainability education literature as it relates to student interest in experiential and deliberative learning. The sustainability education literature, including reports, major frameworks, and dissertations, were tagged and organized in a spreadsheet, resulting in 15 categories. Significant learning frameworks and studies of outcomes in this literature were synthesized to arrive at the two part skills framework that guided the majority of the research.

All 79 sustainability programs were contacted, first via email and later by phone, with requests for program-specific syllabi. 30 programs provided syllabi, making for a response rate of roughly 38%. In total 99 syllabi were received. The syllabi came from a number of course types. These syllabi were downloaded from an open source

33 This growing of the research questions is indicative of the circularity of the qualitative research process. "The close (also temporal) link between collecting and interpreting data and the selection of empirical material, unlike in the traditional linear method of proceeding, allows the researcher not only to ask the following question repeatedly but also to answer it: How far do the methods, categories and theories that are used do justice to the subject and the data?" Uwe Flick, An Introduction to Qualitative Research (SAGE, 2009), p. 92

34 32% came from environmental science/built environment, 11% from economics and business courses, 27% from social science and humanities courses, 7% were food and agriculture specific, 3% focused on skills, 14% were overview courses, and 4% were capstone courses. An unequal number of syllabi was
collection and also requested from members of an Environmental Political Thought list
serve.

The syllabi and program descriptions were imported into Nvivo content analysis
software. Data on these programs and their host universities were organized, along with
data for each specific syllabus, into an excel spreadsheet, which was then imported into
the content analysis software as attribute variables. Each syllabus was coded at least
three different times. Basic information, like assignment values and assigned literature,
was coded by a research assistant. Coding occurred by categorizing segments of data
with short descriptive names, through a process of selecting, sorting, separating and
comparing.\textsuperscript{35} While coding, memos were kept, documenting the development of
understanding of the phenomena, and keeping track of future questions that might be
asked of the data, and noting what other data still needed to be collected.\textsuperscript{36}
Coding of
the syllabi and program descriptions began with open coding, and some selective
coding based on insights from the literature review and participant observation phases
of research.\textsuperscript{37} Open coding has descriptive, rather than explanatory goals. Ideally,
categories and names for categories, “flow from the data. Researchers immerse

\textsuperscript{35} Only one other study was found involving coding sustainability program and course descriptions, but
this study was not relevant to the current research beyond the common data type examined. Ingrid Bonn

\textsuperscript{36} Antony Bryant and Kathy Charmaz, \textit{The SAGE Handbook of Grounded Theory: Paperback Edition}
(SAGE, 2010).

\textsuperscript{37} Juliet Corbin and Anselm Strauss, \textit{Basics of Qualitative Research: Techniques and Procedures for
themselves in the data to allow new insights to emerge.”38 The coding set out to see what could be discovered in syllabi and program descriptions that might contribute to the general understanding of sustainability education as a fairly recent addition to higher education, and also to seek out occurrences of the two-part skills framework, as potential evidence of an updated form of Deweyan democratic education.

Thus aligned with the initial versions of the two-part skills framework derived from the literature, selective coding included references to basic learning skills in critical thinking, systems thinking, communication and collaboration. Different approaches to coding needn’t occur sequentially, and often overlap.39 The initial coding process resulted in the identification of many common teaching components in syllabi and program descriptions and recurrent themes in the content.

The primary coding informed the analysis of interviews with sustainability educators. Initially, the research plan for the interviews involved a semi-structured interview format, and included an interview guide. After two pilot interviews, it became clear that the richness of the interview lay in the educators’ own choice of subject and emphasis, and the format was adapted to an open-ended interview method. Open ended interviews are those where the response patterns or answer categories are provided by the respondent and not the interviewer. Interviews began with the researcher expressing an interest in learning what other educators considered to be their best practices in sustainability education. They were told that the hope was that


39 Strauss and Corbin, Basics.
beyond the dissertation, a book would be written that collected and organized “tricks of the trade” for sustainability educators. Educators were generally excited by this idea. They confirmed that such a resource was much needed, and they were then well primed to discuss their own classroom practice. They began, following this priming, with what worked really well for them. In the latter half of most interviews the conversation shifted to difficulties experienced by the educator, including the extent to which his or her success was dependent upon the support of departments and administrators, or whether and how the practice was achieved despite a lack of organizational support.

All interviews were recorded with a handheld digital recorder and transcribed in full. Notes were taken during the transcription process. Transcriptions were sent to educators for approval, and two out of the twenty-two interviews were amended based on educator suggestions. The average length of these interviews was 3,108 words. The maximum was 9,987 words, the minimum was 1,256 words, and the median was 2,643 words. The focus group interview with sustainability students lasted just over an hour, and occurred during a lunch. The students were told that the purpose of the interview was to identify the worth or value of the type of community-based experiential learning they had recently undergone. The focus group interview totaled 4,886 words, and included the perspectives of four sustainability students. The interview was recorded with a digital recorder and later transcribed in full.

**Ethical Considerations**

The Internal Review Board at the University of Florida approved all data collection for this study. All participant identifications have been kept confidential, except where explicit information to do otherwise has been granted. Student consent to use materials generated during a course was secured after final grades for that course had
been calculated, to ensure there was no unethical incentive for student participation in the study. Interviewees were given the chance to amend their statements, and all participants were given the option to withdraw from the study at any time.

Verifiability

Verifiability occurred in two ways. First, the diversity of data employed, and the triangulated reiteration of findings served as a source of verifiability. Triangulation means using more than one method to open up several perspectives, in the hopes of enriching and further validating the research. It was explained as a social science concept by sociologist Erving Goffman in 1974, and later applied more commonly in descriptions of qualitative research. He was referring metaphorically to the surveyor's practice of making sightings from two known points to a third. Most basically, in order for a study to be considered triangulated, the various approaches to data collection and analysis must at times “meet up” to challenge and clarify the results. In short summary, triangulation occurred as select findings from the student observations guided the review of sustainability education literature, which then informed the initial coding of the syllabi. The syllabi coding was confirmed through recoding, and through confirmation of themes in the interviews with sustainability educators. At the same time, at each stage, new data was collected and more literature was incorporated. The


42 Flick, Managing.

43 Richards and Morse, Read Me.
process was guided by past findings, and adapted to new findings. Alongside this iterative process, interaction between the different data types focused the description and guided further exploration.

Verifiability also occurred in the degree to which the sample of programs from which syllabi were collected was representative of sustainability degree granting programs in the United States, by way of application of the extensive research on sustainability education done by Shirley Vincent, Stevenson Bunn, and Lilah Sloane for the National Council for Science and the Environment. Vincent et al.'s (2013) study focuses on what they call Interdisciplinary Environmental and Sustainability (IES) Programs. The NCSE study strove for a large ‘n’ and statistical significance, identifying undergraduate and graduate degree-granting programs that “focus on the human-nature interface from a broad interdisciplinary perspective. This population included all degree programs named environmental science(s) or environmental studies as well as degree programs with related names such as sustainability, environmental policy, environmental management, environmental systems, natural resource management, and energy.”44 In total, they identified 1,151 programs at 838 institutions. Survey responses were received from 289 of these programs, giving them a response rate of approximately 25%. Representativeness of their sample was confirmed by comparison of defining program attributes between the sample and the population and was found to be representative for all four parameters.45

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44 Vincent et al., *Interdisciplinary*, 40.

45 Vincent et al’s NCSE study differs greatly in its method from my own. Integrating the large N statistical approach taken by the NCSE, which only measures the opinions of program administrators, with the in-depth qualitative analysis of program descriptions and syllabi which I conducted, could result in an
Following the strategy deployed by the NCSE, the sample of sustainability syllabi in the present research was confirmed by comparing the institutional data of the programs (30) that provided syllabi with the institutional data of the larger sample from which syllabi were initially requested (67). The average number of students per institution within the sample was slightly smaller than the average number of students per institution in the sample (11,180 vs 13,192). The following series of charts and tables shows the representativeness of the sample of syllabi, suggesting that the collection of programs that provided syllabi was in fact representative of the larger population from which syllabi were requested.

![Pie Chart: Public or Private Institutions w/in sample (n=30)](chart1.png)

![Pie Chart: Public or Private Institutions w/in population (n=67)](chart2.png)

Figure 2-1. Institutions by Public or Private

e specially fruitful and generalizable description of the state of sustainability education. I am in conversation with Shirley Vincent and the NCSE currently, regarding such a collaboration.

46 Institutional Data was collected and organized for 67 of the 79 initially contacted programs. 12 programs were not included in this measurement for a lack of complete program and institutional level data.
Limitations of the Research Method

While helpful in exploring relatively new or quickly changing phenomena, purposive sampling does have limitations. The interviews represent educators deeply committed to sustainability education. Critics of sustainability education, or proponents of civics education who think that sustainability education is not an appropriate means
for civic educational ends, would have rounded out the participant sample and provided another worthy perspective in the study. While a degree of representativeness of my sample is suggestive following Vincent et al.’s work on sustainability programs, there are limitations to a sample built from those programs willing to comply and provide syllabi, rather than being built with syllabi from a more exhaustive list of sustainability programs, as well as programs that educate in sustainability but do not use the words sustainable or sustainability in their title. Furthermore, sustainability education is in such a state of growth and development it would be very difficult to state with any confidence exactly what the field looked like. This research is exploratory and descriptive, and while possible relationships between institutional and program variables and specific educational experiences are identified, they are mentioned as suggestions for future research into the phenomena of sustainability and civics education, and not asserted as causal relationships. That said, the research offers a first of its kind and most extensive consideration of this relatively new situation in American higher education, and it provides an important empirical and theoretical foundation for future research.47

Lastly, when engaging in mixed methods research, there is a danger that no one method will be fully realized, that the validity of the study can be challenged from so

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47 Early case study research in sustainability education was in many cases methodologically underdeveloped. Peter Corcoran and Kim Walker, “Case Studies, Make-Your-Case Studies, and Case Stories: A Critique of Case -Study Methodology in Sustainability in Higher Education.,” Environmental Education Research 10 (2004): 1–16. Of the 28 case studies in Corcoran’s article, only 2 explained the methodology for their case, and only one provided a critical analysis of the case. The pattern most often followed was: 1 a background description of the institution; 2 a description of the sustainability “challenge” for the institution; 3 a history of the challenge; 4 a description of the innovation, with an emphasis on success (these are what he calls “Make-your-case studies; 5 hints at the cause of the success; 6 conditions necessary to carry the innovation forward (13). Corcoran and Walker then identify a series of criteria, based first on 4 broad concerns which might through their inclusion improve the state of educational research in sustainability: Purpose of the study, Role of all the players, Tension between the context at hand and its applicability elsewhere, and Challenges to the reader (15).
many perspectives, and that the research will appear disorganized. Furthermore, the method requires a huge volume of data, there is a significant degree of ambiguity in when and how each stage of research and data collection is undertaken, and there is likewise a “grey-shade” to the mixture of application and observation that is characteristic of action research.
CHAPTER 3
DEWEYAN ROOTS OF CRITICAL SYSTEMS THINKING

Introduction
The next two chapters of the dissertation explore critical systems thinking from two angles. Chapter Four looks at evidence of critical systems thinking in sustainably education programs and course designs, and reviews a range of contemporary literature relevant to critical systems thinking. This chapter reviews historical pedagogical linkages to Dewey’s “reflective thinker,” which was his response to preparing citizens for democracy in a world of increasing complexity and increasing social potential. As a work of Deweyan pedagogical political theory, this chapter shares in Dewey’s democratic commitments. Like Dewey, it assumes learning is a primary leverage point for the development of flourishing democratic societies. However, the chapter does not posit causal links between Dewey’s theory and the other historical thinkers that are referenced, and it suggests neither a linear historical progression for these ideas nor a culmination of these ideas in critical systems thinking. As comforting as it might be to believe that the subject of this dissertation contains within its theoretical core an impressive pedigree and the endorsement of world historical figures, I would need a time machine to make that claim.¹ The historical thinkers that were chosen for consideration in this chapter were chosen because of the role they play in Dewey’s Democracy and Education.²


² As Dewey writes in Democracy and Education, “The true starting point of history is always some present situation with its problems.” 221
Dewey apparently considered *Democracy and Education* to be one of “the most authentic statements” of his educational philosophy. In *Democracy and Education* he goes to some length to explain how Plato and Rousseau’s writings contributed to his understanding of education for democratic citizenship. Following Dewey, this chapter engages a number of the same thinkers he referenced in his initial explanation of democratic education. The point of this engagement is first to advance toward a complete picture of what is meant by Deweyan democratic education. The point secondarily is to recognize and learn from the ways political philosophers have advanced educational solutions to the problems of social complexity, albeit in vastly different contexts.

**Complexity as a Pedagogical Antecedent**

Civics education is not a new goal, but it is a goal newly formed in democracies facing the ecological challenges associated with the achievement of a sustainable society. Civics today is responding to a world much changed, and a world of accelerating change processes. According to career research by the US Department of Labor, about a third of the workforce will change jobs every 12 months, and by the age of 42 it is likely that a person will have already had ten jobs. The 2010 report found that there was significant growth “in the number of organizations that create groups specifically charged with detecting divergent emerging patterns…” According to Gartner Research analysts, these new jobs will themselves be filled with uncertainty

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and “the de-routinization of work”. Anne-Marie Slaughter, president of the New American Foundation, summarized this shift when she reflected that, “The 21st century is a very bad time to be a control freak.”\(^5\) Civics education in such an age faces the immense challenge of empowering adaptive learners capable of negotiating this new complexity.

Interaction with complexity can open one up to new possibilities and the wonder of the world. Rachel Carson is best known for her work understanding and communicating the unintended consequences of toxins that had been introduced into the environment. Her book *Silent Spring* helped bring environmentalism into public consciousness. And yet, it was another work by Carson, *Sense of Wonder*, that served the more important role in the formation of the ideas in this dissertation. In *Sense of Wonder*, Carson recognized that the solution to our deepest problems exists in our most basic and precious excitement for experiencing the world. Filled with awe at the richness and magic of the diverse beauty of the world, a child dives in and studies it. The more curious and exploratory experiences the child has, the better that child understands his or her niche in the world. In such a way complexity is inspiring and people learn by seeking ever more fulfilling interactions.

But complexity does not only create a sense of awe and enjoyment in life. Emergence in most, but not all cases, involves great indeterminacy. One cannot consistently and with real specificity predict the behaviors of complex systems by

\(^5\) Anne-Marie Slaughter - President, New American Foundation. Also the same quote can be found repeated across the last ten years. For example, Jared Cohen, State Department Policy and Planning Staff is quoted saying, ““The 21st century is a really terrible time to be a control freak,” (Jesse Lichtenstein, “Digital Diplomacy,” *The New York Times*, July 16, 2010, http://www.nytimes.com/2010/07/18/magazine/18web2-0-t.html),
examining their parts or past behaviors. Indeterminacy limits the ability to determine if a storm will become a hurricane, if a stock market will go up or down, if cooperative behavior will emerge, and for how long. The more open and complex a system, the less successfully one can predict outcomes. When the stakes are high, indeterminacy can turn the magic and mystery of the world into terror and crisis. Following the gaining public awareness of environmental limits in the 1970s, some assumed the only possible response to issues of such immense scale and complexity was to increase the power and reach of the state, and possibly to extend that logic toward the formation of a global environmental power that could impose the restrictions needed to curb human impacts.

“The hard, if sad, truth,” it was argued, “is that operating the administrative state - managing Leviathan- necessarily extracts sacrifices from democracy.” Thus, alongside a sense of wonder for the emergent possibility and beauty that accompanies our increasing understanding of complexity, came an argument that suggested a concentration of power and a central point for decision-making, based on the idea that the complexity of environmental problems could only be addressed with an increasingly powerful administrative state.

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Thus, policy makers and environmental activists have responded to complexity with strategies that range from embracing the unknown to command and control of the future. This same range of strategies is brought to light in Dewey’s review of the great political-pedagogical works of Plato and Rousseau in *Democracy and Education*.¹⁰

Neither Plato nor Rousseau respond to social complexity with a singular political-pedagogical approach. In some instances, they describe a program of learning that recognizes the emergent characteristics of education and provides open opportunity and experience with change, stressing the importance of interaction. In other instances, they suggest strong state-controlled notions of civic learning that evoke a sense of indoctrination more than education, and would seem to work to maintain a class system rather than the development of a diverse and adaptive citizenry. Reviewing these developments helps to clarify what it means to view education as an or closed system. For Dewey, only an open learning system would be capable of promoting a flourishing democratic society.

Dewey conceived of an educational theory for the development of adaptive learners in response to the complexity he witnessed in the globalizing and industrializing world of the 20th century. His adaptive pragmatism drew heavily from past thinkers while also innovatively deploying new conceptions of citizenship. Similarly, sustainability seeks to conserve important values, traditions, and resources, while also maintaining a future focus and investment in innovation.¹¹ Taking time to engage with Dewey’s


interpretation of these thinkers and their contributions to his own democratic theory embodies the spirit of sustainability thinking by drawing from the pedagogical and philosophical resources of the past while also looking to the present and emergent citizenship needs of American society. Furthermore, Dewey’s analysis of historical pedagogies emphasizes an important lesson for contemporary education that would enable critical thinkers capable of negotiating considerable systems complexity. There is a tendency to treat complexity as if it were merely a complicated situation, requiring more organization and more control. But complexity is a different kind of problem.

Systems educator Bela Banathy writes, “Educational systems are OPEN systems.” They have “breaks in their boundaries that enable them to interact with their environment and receive information, energy/matter which are essential inputs.” An obvious reaction to complex situations is to simplify: filter out all that is unwanted and reduce the number of variables. In situations that are only complicated (having an excessive number of parts) rather than complex (prone to emergence), simplification is an adequate response. Such has been the standard in education. Through federal curricula reform, through standardized testing, through the solidification of disciplinary lines and canonical literatures, there runs a passion for uniformity and control. It is an

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13 Emergence is explained in further detail below.

14 For “control” as a primary discourse of education see Osberg, Deborah, and Gert Biesta. *Complexity Theory and the Politics of Education*. Sense Publishers, 2010. Here Biesta writes, “[R]eduction of complexity takes place through such measures as putting students of similar age, ability and achievement together, exposing them to the same content through the use of staged curricula and, perhaps most importantly, introducing regimes of assessment and examination through which, from the vast number of possible outcomes of schooling only those are selected that are considered to be valuable. All this works to reduce the complexity of human learning and bring this learning under control” (7).
effort to make the unknown manageable. But social complexity is volatile, ripe with potential, riddled with uncertainty, and full of resources.

Critical systems thinking as a teaching practice and student experience is discussed in the next chapter. The next section of this chapter considers critical systems thinking from a theoretical, reflexive educator perspective, which considers a) what it means to conceive of democratic citizenship education as an open system b) how close Dewey came to articulating a systems perspective of learning, and c) the pedagogical resources that form the foundation of Dewey’s own pedagogy.

Dewey’s interpretations of Plato and Rousseau serve as a theoretical starting point for the dissertation’s consideration of the possibility of contemporary Deweyan citizenship education. In the following pages, Plato and Rousseau’s best known pedagogical contributions are very briefly summarized to provide some grounding for Dewey’s work. Then, Dewey’s reaction to these thinkers and his resultant conception of reflective thinking is described, which is the basis for his adaptive, systematic approach to learning. The resultant understanding derived from the following review of thinkers, in consideration of a critical systems pedagogy, is a renewed and distinctly Deweyan conception of adaptive learning and environment. Within Democracy and Education, Dewey’s conception of the role of environment in learning processes helps to clarify what is meant by critical systems thinking. However, Dewey does not in that text adequately account for learning environments beyond the classroom. To make this connection the chapter also references Dewey's Logic: Theory of Inquiry (1938).

In summary, the relevance of historical pedagogical thinkers to this dissertation is understood in terms of the increased complexity of social-ecological interactions in the
21st century, and responses to this complexity in the form of education for critical systems thinking.

Plato

As far back as ancient Athens, philosophers and theorists have worried about the stability of different political arrangements, and linked these worries to explicit prescriptions for the education of the public. In Plato’s dialogues one can find the roots of contemporary pedagogical frameworks for critical thinking and deliberative, social learning. Through his recounting of the life of Socrates, Plato introduces the reader to the importance of critical engagement with others, as a way to clarify one’s values in open exchange. With Plato the philosophical question becomes, not only the classic question—how does one become virtuous?—but also the more radical question—what is virtue or excellence (arête)? The critical turn in thinking, this questioning of the concept, is posed as a way of living, an opening-up of the soul as a search for truth. It occurs through reflection on the logic of arguments and conceptual constructs, and it is practiced in a community of inquirers in friendly debate. Structured personal and social reflection offered a dynamic and interactive method for the formation of telos. Not the mimicking of Homeric heroes, but critical intellectual inquiry, Plato argued, was the route to virtue.

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15 Dewey in Hickman and Alexander Volume 2,161.

16 According to the depiction of Socrates by Plato in Phaedrus and other dialogues, Socrates followed the Delphic motto, *gnothi seauton* (know thyself), and stressed that knowledge only becomes a part of a person’s virtuous character as that person questions what this knowledge means, assuring its validity, appreciating its practical consequences, and articulating its relevance. Knowledge came not from “expert” or “holy” figures, not from priests, poets, and sophists, but through individual merit for close examination, reflection, and collective deliberation.
But Plato’s consideration of education does not stop with Socratic dialogue. In his most famous work, *The Republic*, Plato reacts to complexity with a plan for a structured, ordered society, where change, or *becoming*, is an unavoidable difficulty to be managed, and, *being*, that which is unchanging, is most real and cherished.\(^\text{17}\) Plato embraced the Socratic emphasis on rational deliberation, but he also condemned the whimsical and irrational character of citizens in democratic Athens.\(^\text{18}\) Plato thought that human rationality in its highest development was the key to achieving a stable and orderly arrangement, both personally and socially. For him this order mirrored the

\(^{17}\) According to the Open Syllabus project, Plato’s *Republic* is the second most commonly assigned work in English language schools. It is second only to Strunk’s *The Elements of Style*, in a list that covers some 933,635 texts. The database can be accessed at [http://explorer.opensyllabusproject.org](http://explorer.opensyllabusproject.org)

\(^{18}\) Plato describes the democratic citizen in scathing detail: “spends as much time and pains and money on superfluous pleasures as on necessary ones…, will shut the gates of the citadel against the messengers of truth, shaking his head and declaring that one appetite is as good as another and all must have their equal rights. So he spends his days indulging the pleasure of the moment, intoxicated with wine and music, and then taking to a spare diet and drink nothing but water; one day hard in training, the next doing nothing at all, the third apparently immersed in study. Every now and then he takes a part in politics, leaping to his feet to say or do whatever comes into his head…His life is subject to no order or restraint…that well describes the life of one who’s motto is liberty and equality” Francis MacDonald (1874-1943) Plato Cornford, *The Republic of Plato / Translated with Introduction and Notes by Francis MacDonald Cornford*, 1St Edition (London; New York: Oxford University Press, 1945), 286.
balanced arrangement of triangles in a tetrahedron.\textsuperscript{19} He called such an arrangement the achievement of justice.\textsuperscript{20}

Dewey recognized Plato’s foundational role in his own political pedagogical writings. Plato offered Dewey an early example of holism in educational thought, where it might be seen that each citizen is recognized as an integral part of a larger unified whole.\textsuperscript{21} At the same time, Dewey criticized Plato, writing, “while his educational philosophy was revolutionary, it was none the less in bondage to static ideals.”\textsuperscript{22} Plato’s Athens may have been a democracy, but Dewey’s understanding was that “the society in which the theory was propounded was so undemocratic that Plato could not work out a solution for the problem whose terms he clearly saw.”\textsuperscript{23} Plato conceived of only three classes of citizens. For Dewey, in contrast, “only diversity makes change and

\textsuperscript{19} Amelie Rorty has explained this position: “Suppose that Plato became convinced that harmonically sensitive mathematics holds the key to knowledge of the Good as the principle (arche) of cosmic order, and so implicitly the key to the direct connection between mathematics and justice as ‘giving each his due.’ In this frame of mind, Plato might reasonably assign increasingly abstract, synoptic mathematical studies pride of place in the design of an educational program. An educational program organized around a mathematics synoptically focused on the study of harmonically sensitive proportional formulae might help assuage Plato’s fears of political irrationality: it might offer the hope of rationalizing apparent incommensurability. Far from recommending mathematical education simply on the grounds that it is useful in implementing public policies-building bridges, constructing effective warships—, Plato is making the more radical claim that it is at the core of deciding whether building bridges or warships is a Good Thing…And properly seen, abstract form and motion are all the more perfect because they can also serve as models for well-ordered systems.” To be sure Plato prefers eternity and transcendence to change and contingency.” Amélie Rorty, \textit{Philosophers on Education: Historical Perspectives} (Routledge, 1998),170-171.

\textsuperscript{20} “When we first began to establish our commonwealth, and several times sense, we have laid down, as a universal principle, that everyone ought to perform the one function in the community for which his nature best suited him. Well I believe that that principle, or some form of it, is justice.” Cornford \textit{Republic} IV.432, p.127.

\textsuperscript{21} Dewey \textit{Democracy and Education}, 94.

\textsuperscript{22} Ibid., 96.

\textsuperscript{23} Ibid., 94.
Plato had no notion of the “infinite diversity” of ways and means for people to act and interact, whereas Dewey envisioned a diverse public in continuous processes of adaptation for improvement and progress. Plato’s society, once achieved, would resort to maintenance of the status quo, rather than continuous improvement based on changing circumstances. Plato’s education aimed to embody the eternal; Dewey’s pedagogy embraced the evolutionary.

In making this argument it is likely that Dewey had recourse to Aristotle, who was more willing to acknowledge that learning came about through interaction with the complexity of the world. Aristotle critiqued Plato’s overemphasis of a rigid orderliness that leads unintentionally to an exaggerated distinction between classes. He writes, “Socrates proceeds, ‘that the greater the unity of the state the better.’ Is it not obvious that a state may at length attain such a degree of unity as to be no longer a state? Since the nature of a state is to be plurality...a state is not made up only of so many men, but of different kinds of men.” The Aristotelian-Deweyan emphasis on diversity indicates an expansion of what is meant by citizenship. If a healthy state involves a diversity of citizens, then too there will be different opinions of the good within that state. Hence, a

24 Ibid.

25 As Dewey points out, “[The breakdown of] [Plato’s] philosophy is made apparent in the fact that he could not trust to gradual improvements in education to bring about a better society which should then improve education, and so on indefinitely” Ibid., 96.

26 Aristotle also shared much in common with his teacher, assuming monarchy (under a good king) or aristocracy to be the best political arrangement. Much like Plato, the best political arrangement resulted from the possession of wisdom and virtue. The goal of the city-state was neither wealth (the oligarchic upper class approach) nor more liberty (the democratic masses approach), but the good life, a life of noble actions, rich with political participation, by which one will achieve happiness Politics bk2ch2 in Aristotle, *The Basic Works of Aristotle*, ed. Richard McKeon, 14th Printing (Random House, 1941).

27 Ibid.
structure of unity does not solve the reality of conflict and disagreement. A structure of stability may seem to be a logical response to complexity, but Plato fell short of the open, learning system that Dewey saw as a precondition to the formation of an adaptive and empowered citizenry.

Rousseau

As with Plato, Rousseau’s work contains both rigid, indoctrinating educational strategies, and in other places efforts to create open, adaptive learners. Rousseau’s writings in Considerations on the Government of Poland (1772) and Discourse on Political Economy (1755) contain his writings on a rigid system of state mandated and managed education such as Plato describes in the Republic.

In Considerations on the Government of Poland he writes “the leaven exists in the hearts of all men and is ready to ferment if only it is stimulated by suitable institutions.” Rousseau’s emphasis on worthy state institutions to inculcate the virtues of citizenship is reiterated in Discourse on Political Economy, where he stresses that this education cannot be trusted to the intelligence and prejudices of fathers and families, since the public has more at stake in education than does any specific family. “Public education,” he writes, “therefore, under regulations prescribed by the government, and under magistrates established by the Sovereign, is one of the fundamental rules of popular or legitimate government.” And the public education he

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29 Though it is beyond the scope of the present work, Dewey does make extensive reference to Aristotle In Democracy and Education, and Aristotle is presented therein as foundational to Dewey's notion of experiential learning.


envisions will have a strong moral component, instilling a love for the country equivalent to a child’s love for her mother. Indeed, he calls the state, the “tender mother.”

In the *Discourse on Political Economy* Rousseau emphasizes the importance of a specific governing body in charge of public education. He calls them “Magistrates…destined to preside over such an education, which is certainly the most important business of the state.” The college of magistrates is “of the first rank who have supreme authority to administer” the public education and the public games. Likewise, in *Considerations on the Government of Poland* he writes, “It is on these institutions that the hope of the Republic, the glory and the fate of the nation depend.” Rousseau’s vision of state-run education is focused on developing strong national sentiment, and so it is equally important to the rich and the poor and if necessary, the poor should be supported by the state. Even if there are parents who prefer a private education for their children, “their games ought always to be public and common to all.”

This is the case, argues Rousseau, because children should learn to abide by

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32 Ibid.

33 Ibid.

34 Rousseau, *Considerations*, 180. The fact that this key aspect of Rousseau’s platonic design is not explained leaves Rousseau open to all manner of interpretation, some of which suggest he is less democratic than his notion of direct participation in law making suggests. Along similar lines, McCormick (2005) suggests that Rousseau’s writings on the Comitia assign leadership to elites and the wealthy within republican and popular governments. Social Contract, 28; “When all these centuries were in agreement, the rest of the votes were not even taken; the decision of the smallest number passed for that of the multitude, and it may be said that, in the *Comitia Centuriata*, decisions were regulated far more by depth of purses than by the number of votes.” Still Ethan Putterman (2010) argues, rather unconvincingly in my opinion, that McCormick misreads Rousseau’s writings on Rome as Proscriptive rather than Descriptive, which was more likely what Rousseau intended. John P. McCormick, “Rousseau’s Rome and the Repudiation of Populist Republicanism,” *Critical Review of International Social and Political Philosophy* 10, no. 1 (2007): 3–27; Ethan Putterman, *Rousseau, Law and the Sovereignty of the People* (Cambridge University Press, 2010).

35 Rousseau, *Considerations*, 179.
public rules, and seek public approbation. Thus goes Rousseau’s argument, much in the vein of Plato’s Republic, for a strong, state-led education that inculcates love of country works to place each citizen where they can best serve the country.

*Emile* (1762), on the other hand, is based not on an ideal country complete with institutions of culture and education, but on the reality of negotiating between the highest potential of an individual, and an existent morally corrupt society. In *Emile*, Rousseau describes how a student must be protected from the clutches of society if he or she is to develop into an individual capable of freedom and prepared for life. Given the distinction between the more Platonic education program described in his *Discourse on Political Economy* (1755) and *Consideration on the Government of Poland* (1772), and the more adaptive, learner-centered education he describes in *Emile* (1762) some have charged Rousseau with being inconsistent in his educational writings. This apparent inconsistency is in truth resolved in the opening paragraphs of *Emile*.

Rousseau begins *Emile* with a discussion of the conflicting aims of humanity, which, most basically, include satisfying one’s own natural inclinations on the one hand, and satisfying the needs of a larger society or social group on the other hand. He writes, "Drawn this way by nature and that way by man, compelled to yield to both forces, we

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37 Samuel Smith, Ideas of the Great Educators (New York: Joanna Cotler Books, 1980), p.140; Judith Shklar, “Rousseau’s Two Models: Sparta and the Age of Gold,” *Political Science Quarterly* 81, no. 1 (March 1966): 25–51. Furthermore, the apparent inconsistency is all the more troubling given that Rousseau published *Emile* in-between his two more rigid pedagogical writings. Thus it is not likely that the shift is explained merely by a change in his thinking, from idealism to institutional realism, over the course of his life.
make a compromise and reach neither goal…Two conflicting types of educational systems spring from these conflicting aims. One is public and common to many, the other private and domestic. If you wish to know what is meant by public education, read Plato’s *Republic.* But Rousseau’s *Emile* begins from the premise that the sort of public education described in Plato’s *Republic* cannot be, since a country and a citizen such as Plato describes has not ever actually existed.

Given that the ideal public education does not exist, for it would require a country capable of producing such an education, the practical reality is that some sort of private education must occur that can at least educate for what is best in a human. Plato’s reaction to the reality of corruption and moral chaos in *The Republic* is to prescribe a strong state system that can draw everyone back into line. Rousseau reacts differently to the reality of corruption. He explains that in the past the youth were educated to fill a specific place in the social order. Outside this specialization, a student would be lost and without prospects. In such situations the son was compelled to follow the father, and it was hoped fate would agree with the parents’ choice. But this approach, Rousseau argues, does not work in situations that are not so stabilized by tradition, or situations where coherence with such traditions is not desired.

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39 “The public institute does not and cannot exist,” he writes, “for there is neither country nor patriot. The very words should be struck out of our language. The reason does not concern us at present, so that though I know it I refrain from stating it.” Ibid., 9.

40 “We must reach the heart of the young adolescent, and stimulate in him the first impulses of nature; we must develop that heart and open its doors to his fellow-creatures, and there must be as little self-interest as possible mixed up with these impulses;” Ibid., 224.

41 “In the social order where each has his own place a man must be educated for it. If such a one leave his own station he is fit for nothing else. His education is only useful when fate agrees with his parents’ choice; if not, education harms the scholar, if only by the prejudices it has created. In Egypt, where the son was compelled to adopt his father’s calling, education had at least a settled aim; *where social grades*
Critiquing Aristotle’s three categories of citizenship, Rousseau continues, “It matters little to me whether my pupil is intended for the army, the church, or the law. Before his parents chose a calling for him nature called him to be a man. Life is the trade I would teach him. When he leaves me, I grant you, he will be neither a magistrate, a soldier, nor a priest; he will be a man. All that becomes a man he will learn as quickly as another. In vain will fate change his station, he will always be in his right place.” Education of a certain kind, argues Rousseau, can result in a student with skill in adapting to a range of situations, trained to life and for humanity, rather than a specialized position in a single career or class, as Plato had envisioned in his Republic. Given the corruption of society, Rousseau stresses the importance of the natural world as an alternative setting and source for learning.

In summary, there is ample material for those who would consider Rousseau as a platonic thinker. But Rousseau accomplishes something far more relevant to Dewey’s democratic project in *Emile*. Rousseau recognized that complexity is best negotiated with the cultivation of adaptive and independent learners, if a strong state system cannot be counted upon, and he did much to envision the consequences for education that would prepare a student for self-governance across a range of complex scenarios.

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*remain fixed, but the men who form them are constantly changing, no one knows whether he is not harming his son by educating him for his own class.*” Ibid., 9.

42 Ibid., 10.

43 For more on this see David Lay Williams, *Rousseau’s Platonic Enlightenment*, 1st edition (University Park, Pa.: Penn State University Press, 2008).
According to Dewey, while Plato saw the end of education to be the good of the state, Rousseau’s *Emile* saw the end of education to be the good of humanity.\(^4^4\)

Rousseau believed that education came from three sources: things, men, and from nature. Dewey reflected at length on the eighteenth century use of the term *nature*, which Rousseau draws on in his conception of the individual and the ends of education. Rousseau believed that education from nature, “the inner growth of our organs and faculties” was truest. Thus what is natural is that aspect of education that cannot be controlled, and so must be followed.\(^4^5\) What is natural is the individual.\(^4^6\) Rousseau describes a submission to nature, but it is not an unpleasant submission and through it the individual is rewarded and made whole.\(^4^7\)

Dewey suggests that Rousseau’s use of nature is important but also limiting. Nature is important because it leads to realization of the benefits of the educator spending time observing the student, and by these observations recognizing a student’s “natural” gifts and talents. Rousseau is thus credited as a founder in child-centered education. Arguably, the results of his perspective are educators that are more invested

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\(^4^4\) “The positive ideal was humanity. In membership in humanity, as distinct from a state, man’s capacities would be liberated;” John Dewey, *Democracy and Education*, Penn State Electronic Classics (Hazleton, PA: Pennsylvania State University, 2001), 96

\(^4^5\) “Now of these three factors in education nature is wholly beyond our control, things are only partly in our power; the education of men is the only one controlled by us; and even here our power is largely illusory, for who can hope to direct every word and deed of all with whom the child has to do.” Ibid., 6.

\(^4^6\) “The natural man lives for himself; he is the unit, the whole, dependent only on himself and on his like. The citizen is but the numerator of a fraction, whose value depends on its denominator; his value depends upon the whole, that is, on the community.” Ibid., 7.

\(^4^7\) “I should also keep as close as possible to nature, to gratify the senses given me by nature, being quite convinced that, the greater her share in my pleasures, the more real I shall find them. In the choice of models for imitation I shall always choose nature as my pattern; in my appetites I will give her the preference; in my tastes she shall always be consulted; in my food I will always choose what most owes its charm to her, and what has passed through the fewest possible hands on its way to table. I will be on my guard against fraudulent shams; I will go out to meet pleasure.” Ibid., 311.
in a receptive and adaptive approach to interacting with students. Dewey considers this a far more ideal pedagogical starting place than the preceding generation assuming their own habits and behaviors are best, where education becomes merely a process of transmitting these same tendencies. The concept of “nature” was also important as part of the historical shift toward the natural sciences, and a new way to search for balance, a way out of “artificial man-imposed coercive restrictions.” It marked the beginning of the shift toward an integrated, scientifically informed ideal for the progressive adaptation and management of societies, which is the very vision Dewey aspires to in his suggestion for an integration of technical and humanist educational programs.

But Dewey also criticized Rousseau for having too much faith in the “natural” progress of the person. Rousseau’s nature was too essentialist a backdrop for Dewey; it could lead, as Dewey later explained in *The Democratic Faith and Education*, to the idea that a flourishing democracy did not require diligent maintenance by a capable citizenry. In place of a faith in the natural, as it is variously deployed by Rousseau,

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49 “At all events, adults too easily assume their own habits and wishes as standards, and regard all deviations of children’s impulses as evils to be eliminated. That artificiality against which the conception of following nature is so largely a protest, is the outcome of attempts to force children directly into the mold of grown-up standards.” Dewey, *Democracy and Education*, 122.

50 Ibid., 97.

51 Recall this is discussed in detail in the introductory chapter

52 In *Freedom and Culture* (1939) Dewey posited a similar criticism against Thomas Jefferson, who was born roughly 30 years after Rousseau (1743). Dewey claimed Jefferson was “the first modern to state in human terms the principles of democracy.” However, argues Dewey, situations have changed since Jefferson first wrote about democracy, and Jefferson’s approach needs updating: “[T]he doctrine of natural rights which governed his style of expression has been weakened by historic and by philosophic criticism… But his fundamental beliefs remain unchanged if we forget all special associations with the
Dewey suggests that educators seek the highest learning potential through the cultivation of *environment*. The goal, argued Dewey, was not to leave people alone to their natural devices, to their "spontaneous development, but to provide an environment which shall organize them." Dewey saw that the way science is conducted, and the way a person acquires and learns from experiences in day to day life is not in principle distinct. He suggested a reshaping of learning environments that would offer students more firsthand experience with problems that required a critical appraisal of situations and the need to engage in social cooperation, just as students would find beyond the confines of the classroom.

However, the environment as Dewey describes it in *Democracy and Education* is not what today is meant by environment as a natural setting or the subject of environmentalism, typically. Rather, Dewey’s conception of environment is largely about institutional settings and social settings. He writes, “that evil institutions and customs

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53 Dewey, *Democracy and Education*, 120.

54 “When persons meet together in conference to plan in advance of actual occasions and emergencies what shall later be done, or when an individual deliberates in advance regarding his possible behavior in a possible future contingency, something occurs, but more directly, the same sort as happens in understanding intellectually the meaning of a scientific treatise.” John Dewey, *The Later Works of John Dewey, 1925-1953: 1938, Logic - The Theory of Inquiry*, ed. Jo Ann Boydston (SIU Press, 2008), 49.
work almost automatically to give a wrong education which the most careful schooling cannot offset is true enough; but the conclusion is not education apart from the environment, but to provide an environment in which native powers will be put to better uses."\textsuperscript{55} Dewey argues that classrooms and schools as they commonly exist “are hostile to the existence of real situations of experience, “and thus are not conducive to reflective thinking; this is the problem with typical learning environments.\textsuperscript{56} It is through this consideration of environment that Dewey begins to articulate his own ends for education, beginning with reflective thinking.

\textbf{Deweyan Reflective Thinking}

In Chapter 2 of \textit{Logic: Theory of Inquiry}, Dewey explains more fully what environment means for a given organism. He writes, “The processes of living are enacted by the environment as truly as by the organism; for they are an integration.”\textsuperscript{57} Hence one can see something like an early systems perspective in Dewey’s concern for the quality of an environment in regards to its learning potential. He continues, “With differentiation of interactions comes the need of maintaining a balance among them; or, in objective term, a unified environment... The effect of this delicate and complex system of internal changes is the maintenance of a fairly uniform integration with the environment, or – what amounts to the same thing – a fairly unified environment.”\textsuperscript{58} One can speculate that such a “unified environment” would serve as Dewey’s basis for a

\textsuperscript{55} Dewey, Democracy and Education, 123.

\textsuperscript{56} Ibid., 161.

\textsuperscript{57} Dewey, \textit{Logic}, 32.

\textsuperscript{58} Ibid., 33.
definition of sustainability, were he alive today. More to the point, Dewey takes this systems approach to understanding the basic organismic interactions with environment, and expands if for the human case: "In organisms of the higher order, the special and more definite pattern of recurrent behavior thus formed does not become completely rigid. It enters as a factorial agency, along with other patterns, in a total adaptive response, and hence retains a certain amount of flexible capacity to undergo further modifications as the organism meets new environing conditions." 59 In this description the basic components of learning in complex systems are laid out: interaction within a larger system (environment), and agency for adaptive and flexible capacity, as a response to new environing conditions. Humans affect cultural change in such systems, along with biological change. Cultural change is dependent upon language and communication, broadly conceived. 60

Dewey has been criticized for removing the political dimension from civil society, for focusing on knowledge in a singular and apolitical fashion, and for failing to consider the way conflicts and complex relations of power function in democratic societies. 61 These criticisms are based in part on Dewey’s reliance upon the seemingly objective terms of science, and his insistence that science should come to inform the way we understand human interactions and social development the way it had in the physical sciences. Much of Dewey’s work can be read as a naïve application of the scientific

59 Ibid., 39.

60 “The especial function of language in effecting the transformation of the biological into the intellectual and the potentially logical.” Ibid., 51

61 For a summary of these criticism see Harry Boyte, “A Different Kind of Politics: John Dewey and the Meaning of Citizenship in the 21st Century,” The Good Society 12, no. 2 (2003), 7,8.
method, laid over all manner of social problems. In sweeping form, he wrote that “science is by far the most potent social factor in the modern world.” But Dewey’s vision of scientific impact seems less naïve today, and key facets of his theory of learning and interaction with environments resemble contemporary practice in environmental management and organizational learning. Moreover, the science-policy interface around fracking and climate change, for example, suggest that Dewey was right to fear that science and technology would become potent social factors for private gain, without public oversight. His conception of reflective thinking is a response to this situation, and means to empower a citizenry for critical engagement with the problems of the day, and for careful consideration of possible outcomes of actions, and how best to engage and affect meaningful, safe to fail change strategies and appropriate applications of scientific advancement, even in situations diffused with complex power relations.

According to Dewey, a democratic education is one conducive to “A society which makes provision for participation in its good of all its members on equal terms and which secures flexible readjustment of its institutions through interaction of the different forms of associated life…Such a society must have a type of education which gives individuals a personal interest in social relationships and control, and the habits of mind which secure social changes without introducing disorder.” Dewey’s democratic education made great use of the scientific method, and he called upon the scientific method to describe the deliberative processes by which a public might decide, test, and

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63 Dewey, Democracy and Education, 104.
later decide again on public issues, and also to describe how a person experiences, suggests improvements, tests and learns and experiences again. But Dewey’s science is less a science of linear proofs and more a recognition of the dynamic complexity of the world, including the social world, and his emphasis was always that science and technology should work for the public good.

During the course of Dewey’s life people began to witness the consequences of industrialization and accelerated technological development. Dewey’s time was also the time in which the science of ecology first developed, and complexity emerged along with interests in wholes, parts, and adaptive systems. He wrote, “[T]he outstanding belief in all branches of natural science is that to exist is to be in process, in change. Nevertheless, although the idea of movement and change has made itself at home in the physical sciences, it has had comparatively little influence on the popular mind as the latter looks at religion, morals, economics, and politics…A philosophy of experience will accept at its full value the fact that social and moral existences are, like physical existences, in a state of continuous if obscure change…For the futile effort to achieve security and anchorage in something fixed, it will substitute the effort to determine the character of changes that are going on and to give them in the affairs that concern us most some measure of intelligent direction.”

Similarly, in 1909 he credited Darwin with overcoming the “principle of life” - that nature could be understood in pure contemplative intelligence - for “the principle of transition.” Thus, Dewey applied his sense of

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66 He wrote, “Doubtless the greatest dissolvent in contemporary thought of old questions, the greatest precipitant of new methods, new intentions, new problems, is the one effected by the scientific revolution
emergent complexity to the social world and made conclusions for education based on this scientific fact. Through his adaptation of the Darwinian concept of evolution, and in the emerging notion of systems theory and ecology which is evident in his understanding of situations and social-ecological interaction, he maintained the importance of moral development within a framework informed by the scientific method. He distinguished the development of this adaptive and intelligent way of moving though the world from simple habit or trial and error, and he called it, “reflective thinking.”

Dewey summarized reflective thinking to include a) an initial experience of confusion or recognition that a situation is incomplete, followed by b) a consideration of the situation with a view to certain possible consequences. Step “a” and “b” are described as basic trial and error experimentation. But then reflective thinking kicks in, and the person c) takes a careful survey of all possible aspects of the situation that can be known, to improve clarity and understanding of the situation, which is then applied to d) an improved and amended version of the original hypothesis, bringing the plan more in line with all the discovered facts, and ending with e) action to bring about the intended result, as a form of hypothesis testing.67

There is much in common between Dewey’s initial formula for reflective thinking and present day efforts to manage complex socio-ecological systems. Just as Dewey understood the need for diversity in these systems, present day systems thinkers and ecologists acknowledge a “general understanding of how diversity increases a system’s

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ability to cope with change, reduce its sensitivity to loss of components, and creates a more satisfying experience for human well-being." Strategies for adaptive resilience based on this understanding include promoting locally derived adaptations and solutions and enabling a diversity of local decision-making structures and opportunities, to minimize the dominance of singular solution orientations.

Importantly, to the extent a person can develop the kind of expanded capacity for seeing connection and understanding possible consequences as it is described by Dewey, he or she is not merely developing an ability to act intelligently as an individual; the expanded scope of potential consequences also informs social intelligence and personal sense of responsibility to others. Thus, it is a development of moral intelligence as well. “Only gradually and with a widening of the area of vision through a growth of social sympathies does thinking develop to include what lies beyond our direct interests: a fact of great significance for education.” This is the scientific contribution to moral intelligence. At the core of critical systems thinking is a process for increasing one’s understanding and awareness of personal connection to, and social participation in, impacting the world and affecting the quality of social and environmental interactions. It functions as a lens that cuts to the core of issues, reveals assumptions, and also empowers the thinker to identify diverse partnership possibilities and leverage points that can enable more productive interactions and change-making in complex situations.

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69 Ibid.

70 Dewey, Democracy and Education, 154.
Conclusion

For Plato, the stable soul, and ultimately the stable state, is achieved through a just arrangement, which means all types where they should be. The ultimate social arrangement involves right education for all citizens, which is labeled an education in justice.\footnote{Cornford, \textit{The Republic}, 442.} Plato, through his recounting of the life of Socrates, introduces us to the importance of critical engagement with others, the process of achieving understanding and clarifying one’s values through personal and social deliberation. And Plato saw order occurring in the stability of the state, the stability of the management of the state, and its system of laws and education.

Like Plato, Rousseau saw that the world contained a complex arrangement of social and individual tendencies, for good and for bad. As a response to this situation, \textit{Emile} attempts to build up the individual despite corrupting societal influences. But Rousseau’s education for individuality should not be confused with an education for individualism. Experiential learning, for Rousseau, is learning about relationship. He writes, “Man’s proper study is that of his relation to his environment. So long as he only knows that environment through his physical nature, he should study himself in relation to things; this is the business of his childhood; when he begins to be aware of his moral nature, he should study himself in relation to his fellow-men; this is the business of his whole life...”\footnote{Rousseau would have humanity develop moral and spiritual understanding, and true “other” regard, only in adulthood; in the late stage where natural inclination to these questions, and the ability to seek out one’s own path is already in play. As a child, the primary learning goals are natural inquisitiveness and physical strength, as well as humility to speak only what one knows about and respect for one’s teachers. It is the task of the teacher to cultivate the proper environment for these various stages of learning. The} Rousseau’s pedagogy for early nature play and later moral development
is a stark contrast to the current American educational system’s push in the exact opposite direction.

If college students today were given ample chance to explore, consider, and challenge a great many world views, and if young children were given ample chance to play and practice their freedom without the corrupting tendencies of a society devoted to self-aggrandizement and ego, then we would have achieved something like the strategy for education described by Rousseau in *Emile*. In fact, the current state of affairs in the United States increasingly moves in the opposite direction. Children are denied free play in the outdoors, extracurricular activities are the first to be cut from school budgets, and young adults are increasingly limited in their opportunity to explore diverse world views and hold enriching conversation with diverse opinions, as college curricula include less room for electives, and a lower valuation of the liberal arts education that would assumedly offer interaction with a diversity of worldviews.

Albert Einstein once wrote in LIFE magazine (1955) that “The important thing is to not stop questioning. Curiosity has its own reason for existence.”73 Scientists know this fact as well as artists. Learning can be magical. The world can cast a spell with its beauty, and with the mystery and awe that is embedded in each learner’s realization of the earth’s dynamic nature: how small and how large, how patterned and how chaotic, how mathematical and how poetic. “It’s not magic,” wrote physicist Doyne Farmer, “but

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73 “The important thing is to not stop questioning. Curiosity has its own reason for existence. One cannot help but be in awe when he contemplates the mysteries of eternity, of life, of the marvelous structure of reality. It is enough if one tries merely to comprehend a little of this mystery each day. Albert Einstein, "Old Man's Advice to Youth: 'Never Lose a Holy Curiosity.'" *LIFE Magazine* (2 May 1955), 64.
it feels like magic.” Farmer was talking about the emergent qualities of complex systems. With only simple instinctive rules, flocks of birds and schools of fish move together in gorgeous waves of synergy, acting as if they were a single larger organism. Water molecule upon water molecule band together, and suddenly emerges the liquid presence that fills our planet, that catches wind and is pulled by the moon, and is capable of still further emergent behaviors in gaseous and solid forms; and not one of these behaviors is possible for an individual water molecule.74

Dewey’s democratic education called forward empowered individual thinkers who could identify the complex and multilayered consequences in a given situation, and adapt their plan of action and learning to what they experienced over time. The task of education, which inherently and increasingly will grapple with complexity in the coming years, is to present students with opportunities to practice open and proactive interactions with complexity, to develop critical systems thinking skills. Dewey believed that “individuals who prize their liberties and who prize the liberties of other individuals, who are democratic in thought and action, are the sole final warrant for the existence and endurance of democratic institutions.”75 Such individuals did not naturally arise into the world as a manifestation of human evolution. Rather, such an individual is supported and promoted through environments conducive to reflective thought on real world experiences.

The arguments of the administrative state and the environmental leviathan suggest that a diminished democracy is a necessary sacrifice for the achievement of a

74 Corning, Emergence.

sustainable society, but that argument is a contradiction in terms for those who would argue sustainability requires, either normatively or instrumentally, democratic commitments to justice, inclusivity, and opportunity. Dewey wrote that, “Democracy must be reborn in each generation. Education is the midwife.”76 Whether democracy be a normatively important or instrumentally requisite aspect of a sustainable society, education has an important role to play in the development of a citizenry capable of negotiating the increased complexity of the 21st century. Reflective thought, as a cognitive process that includes careful consideration of a situation with the greatest depth of complexity and consequence that can be achieved, and the formation of temporary, adaptable experiments for the improvement of these situations, can in today’s ecologically informed world be understood as a practice of critical systems thinking, and includes new techniques for modelling complexity, and understanding consequences across temporal and spatial scales. It is to these contemporary practices of critical systems thinking, as they are found in sustainability classrooms and coursework, that the dissertation now turns.

CHAPTER 4
CRITICAL SYSTEMS THINKING OPEN AND CLOSED

Introduction

This chapter investigates the integration of critical and systems thinking within sustainability studies classrooms. After reviewing the distinct literatures on critical thinking and systems thinking, the chapter reports on the prevalence of both skill sets within sustainability studies syllabi and program descriptions, and identifies possibilities for future research, based on the findings. The chapter as a whole means to contribute a fairly novel synthesis of fundamental thinking skills, called critical systems thinking, which is presented as a cognitive basis for civic practice in ecologically-informed democracies. Applying a multiple outcome framework developed by educational researcher Gert Biesta, the chapter works to delineate a range of strategies and potential outcomes for critical systems thinking. The results of the analysis suggest that critical systems thinking has neither a singular outcome nor a guaranteed benign effect.

Systems thinkers look for leverage points for change. Social systems are primarily open systems, which means there is great potential for transformation. Within social systems great leverage exists in transforming and transcending existing paradigms and worldviews. Proponents of critical thinking and critical pedagogy are careful to point out that education in worldviews and processes of individuation should not be predetermined by educators. Sustainability education in some instances might involve indoctrination into specific value systems rather than empowering education that enables novel and socially informed developments in individuation. An indoctrinating systems thinking is not a critical systems thinking. The chapter reviews the prevalence of critical systems thinking in sustainability syllabi and program descriptions, and
indirectly suggests a novel approach to designing learning outcomes that work to avoid an overly predetermined engagement with student worldview and paradigm development.

**Critical Thinking and Systems Thinking as Distinct Skill Sets**

Critical Systems thinking is not simply an aggregate of systems thinking and critical thinking, and both these terms are ambiguously used to account for different phenomena in a range of interdisciplinary literatures. The next section of the chapter takes these two skills – critical thinking and systems thinking, and explains them in detail, but first, here, the chapter gives a brief overview of the commonality of occurrence of the terms within relevant literature.

Critical thinking is a standard skill set in the civic education literature. A word search for critical thinking in the *Journal of Political Science Education* over the course of that publication’s eleven-year history returned 136 articles. Systems thinking, on the other hand, is almost entirely neglected as a skill of citizenship, and a search for systems thinking in the *Journal of Political Science Education* returned one article.¹

Within the sustainability education journals the picture is much different. Critical thinking continues to be the standard, but systems thinking is shown to be an increasingly relevant term as well. Within the EER, the overall growth rate for critical thinking is 102% and the overall growth rate for systems thinking is 132%. Within IJSHE the overall growth rate for critical thinking is 65% and the overall growth rate for systems thinking

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¹ These searches were performed using Google Scholar advanced search on April 19 2016. Additional searches confirm this trend: In the journal *Education, Citizenship, and Social Justice*, which has been in publication for a decade, the search term “systems thinking returned 0 articles, and the search term “critical thinking” returned 41 articles. In the journal *Citizenship Studies*, which has been in publication for two decades, the search term “systems thinking returned 0 articles, and the search term “critical thinking” returned 14 articles.
thinking is 94\%^{2}. Thus, systems thinking is an increasingly prevalent theme in sustainability education.

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\[\text{Overall growth rate was calculated by averaging the growth rate of all publication periods.}\]
Within all three journals, in a little less than half the articles that mention systems thinking, critical thinking is also mentioned. The co-occurrence and grouping of the terms is confirmed by their common occurrence in 21st century learning frameworks.\(^3\)

![Figure 4-4. Critical and Systems Thinking Co-Occurrences](image)

Within this study’s sample the ratio for the number of syllabi that mention critical thinking compared with systems thinking roughly equals the same ratio of each term within the primary sustainability education journals in their most recent publishing period (2010 - 2015).\(^4\) This finding suggests that the sample is representative of publication trends in sustainability education journals.

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\(^4\) Interestingly, the ratio did not hold within the sustainability-related publication, *Environmental Education Research*, which is not as explicitly focused on sustainability education.
Critical thinking is the more prevalent skill set in both sustainability education and civic education, but systems thinking has a significant presence in the sustainability literature while it is entirely neglected in much conventional citizenship education literature. Furthermore, systems thinking is an increasingly relevant topic in sustainability journals with more than a ten year publication history; and in more recent sustainability education journals systems thinking appears to have a consistent presence in publications alongside critical thinking.

**Systems Thinking**

Systems thinking received a boost in popular appreciation following the publication of Peter Senge’s *The Fifth Discipline* (1994). Senge’s thesis outlined five lifelong practices for people in learning organizations. Learning organizations are “organizations where people continually expand their capacity to create the results they
truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to see the whole together.”

The first four disciplines are personal mastery, mental models, shared vision, and team learning. The last discipline, and the subject of Senge’s book, is systems thinking: “A way of thinking about, and a language for describing and understanding, the forces and interrelationships that shape the behavior of systems. This way of thinking helps one to see how to change systems more effectively, and to act more in tune with the larger processes of the natural and economic world.” Systems thinking is Senge’s “fifth discipline” because it functions as a lens through which all the other practices can be integrated toward a specific aim.

It is through systems thinking that people can observe the organization as a dynamic, changing whole, and strategize for long term and comprehensive change.

More than a tool for problem solving, Senge argues that systems thinking is most powerful as a language, “augmenting and changing the ordinary ways we think and talk about complex issues.” The role of systems thinking in developing understanding and facilitating communication of complex scenarios can be traced back to Jay Forrester’s work on system dynamics.

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7 Senge has been criticized for limiting the scope of his analysis to learning organizations, and doesn’t do enough to make connections with societal concerns, such as social justice or democracy; these concerns have since become more important in conversations on business and management ethics and best practices. See M Smith, “Peter Senge and the Learning Organization,” The Encyclopedia of Informal Education, 2001.

8 Senge, The Art & Practice.
Jay Forrester’s tenure at MIT lasted over 70 years, and as of this writing he is 97 years old. Forrester developed many of the modeling tools with which people now understand and communicate the complex interaction of parts within a dynamic whole. His seminal work on systems is important beyond its methodological relevance for sustainability thinkers and practitioners. Forrester’s methods were utilized to produce the first models of urban poverty, and later of global resource trends in *Limits to Growth*. In the second half of his career, Forrester focused on education and experimented with living learning models at MIT’s school of management. He wrote a number of pieces on the subject of systems thinking education. Forrester’s model of systems thinking education includes a range of personal learning outcomes:

1. Sharpen clarity of thought and provide a basis for improved communication
2. Build courage for holding unconventional opinions
3. Instill a personal philosophy that is consistent with the complex world in which we live
4. Reveal the interrelatedness of physical and social systems
5. Unify knowledge and allow mobility among human activities.  

Marianne Krasny (2009) has worked to link education in systems thinking with needed civic skills. She writes, “Social–ecological systems resilience refers to the sustainability of such systems in the face of ongoing change (e.g., demographic shifts, climate change) and disasters (e.g., hurricanes, terrorist attacks) (Folke et al. 2002). Attributes of resilient systems include diversity in biological and cultural resources and in the types of knowledge that are integrated into management decisions (e.g., local and scientific knowledge); ecosystem services (MEA, 2005); adaptive or social learning;

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social capital; innovation; redundancy in governance; and self-organization (Walker and Salt 2006). We have coined the term ‘civic ecology education’ to describe environmental education programs that attempt to embody and foster these resilience attributes.”

Krasny’s civic ecology practices are community based and ecologically motivated social learning opportunities, such as community gardening, local habitat restoration, and community forestry. These are solutions-oriented approaches to achieving sustainability through civic action informed by systems analysis.

Peter Checkland’s work in the 1970s and 1980s applied Forrester’s systems framework to solutions-oriented work in organizational learning and action research. In his efforts to distinguish systems from conventional science, Checkland stresses that systems thinking is most appropriately applied to unpredictable, complex situations. Furthermore, he sees systems thinking and conventional scientific thinking as worldviews, or paradigms, in the Kuhnian sense. His explanation is helpful in grasping the place of systems thinking:

Science provides us with a scientific approach just as systems provides a systems approach. Both are meta-disciplines, and both embody a particular way of regarding the world. The scientific outlook assumes that the world is characterized by natural phenomena which are ordered and regular not capricious, and this has led to an ineffective way of finding out about the regularities—the so-called laws of nature. The systems outlook, accepting the basic propositions of science, for it is a part of the scientific tradition, assumes that the world contains structured wholes which can

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maintain their identity under a certain range of conditions and which exhibit certain general principles of wholeness. Systems thinkers are interested in elucidating these principles, believing that this will contribute usefully to our knowledge of the world.\(^\text{13}\)

By conventional science, Checkland means the idea that wholes can be divided and reduced to parts of those wholes without losing essential characteristics of the larger system. The science of Ecology and the results of complex computer models suggest that this is in many instances not the case. Checkland argues that most social systems can be characterized as soft systems that have ill-structured or unstructured problems. Another way of thinking about this is to say these are the problems of open systems, and not all inputs are known.

A primary outcome of Checkland’s early research on open and ill-structured systems is the methodological conclusion that the interface of systems thinking and social phenomena is best understood in terms of action research. This is the case because there is no getting around a researcher’s involvement in a social process, and there is no getting around the uncertainty of emergent social behaviors.\(^\text{14}\)

Problem solving with systems thinking begins with “an expression phase during which an attempt is made to build up the richest possible picture, not of the problem, but of the situation in which there is perceived to be a problem.\(^\text{15}\)” After this, root definitions are deciphered from the overall situation, and then models are developed based on these root definitions. The model or models are then compared again with the

\(^{13}\) Peter Checkland, Systems Thinking, Systems Practice: Includes a 30-Year Retrospective, 1 edition (Chichester ; New York: Wiley, 1999), 6.

\(^{14}\) ibid., 153.

\(^{15}\) ibid., 153.
description of the situation, ideally by numerous people, and the goal is to generate a
debate with concerned people, working to identify changes to the model that are both
desirable and feasible. Following these modifications, action is taken.\textsuperscript{16}

Checkland predicted in 1980 that systems thinking and analytical thinking would
eventually come to be thought of as the twin components of scientific thinking.\textsuperscript{17} It may
be that his vision will come to pass through what is now called sustainability science,
and through applications of systems thinking to social change and activism.

Following Checkland’s lead, the contemporary literature on systems thinking is
focused on practical applications of systems thinking toward the generation of solutions
to complex problems. These are the kinds of problems we associate with the complexity
of social-ecological interactions and the unintended consequences of the intensified
impact of humans upon the earth system. Systems thinkers in management, leadership,
and organizational change have worked to help the nonprofit, public and private sectors
adapt to a changing world through the use of improved systems thinking practices.

Peter Stroh’s recent work is a foremost example of applied systems thinking.\textsuperscript{18}
As with Senge’s model for change in \textit{The Fifth Discipline}, Stroh’s strategy of design for
change-making begins with raising awareness of the difference between what a person
desires, and where they are currently. Students being introduced to systems thinking

\textsuperscript{16}Compare this language with Dewey’s, a half century earlier: “In actual experience, there is never any
such isolated singular object or event; an object or event is always a special part, phase, or aspect, of an
environing experienced world – a situation.” Dewey, “Common Sense and Scientific Inquiry” reprinted in
Hickman and Alexander, \textit{Volume 1}, 384.

\textsuperscript{17}ibid., pp.67, 175

\textsuperscript{18}David Peter Stroh, \textit{Systems Thinking for Social Change: A Practical Guide to Solving Complex
Problems, Avoiding Unintended Consequences, and Achieving Lasting Results} (Chelsea Green
through Stroh’s approach would first practice modeling their given situation. They can do this within the context of any range of questions. For example, students could work together to identify why so few students ride bikes to campus. In doing this they would not only be identifying the behaviors of others. They would also be identifying their own tendencies and their own underlying assumptions, values and desires. Lastly, they would be identifying the social structures and aspects of the built environment that contribute to the personal perspectives and decision making involved in whether or not a person chooses to ride a bike.

The second stage in Stroh’s process is where students begin to explore and seek out information that is relevant to the change they wish to incite. At this stage, students do research, conduct interviews, and identify people in the community that should be sought out to improve the local and contextual understanding of the situation. In the third stage students “consciously choose change”. This means that instead of blindly moving toward the change that is desired, they identify the costs of those changes, and they identify the short term benefits of the current system, which have real immediate appeal, but must be seen for the short term gain they represent. It is at this stage that students recognize the change they seek may require significant effort, time and often money.19

In the last stage of Stroh’s approach, the students would identify leverage points and establish a process for continual learning and expanded engagement toward the changes they seek. The challenge of change for systems thinkers is largely a challenge of identifying leverage points. Stroh employs the iceberg metaphor to convey this notion

19 Stroh, Systems, ch 5.
of leverage and its relation to the unseen variables and components that contribute to a holistic understanding of a given situation. The majority of a situation goes unseen, just as the majority of an iceberg is underwater. These substantial but less obvious aspects of a situation constitute the framing and perspectives of people in a given situation; the underwater majority of the iceberg includes worldviews, methodological paradigms, and the institutional path dependencies that provide the most leverage for change.\(^{20}\)

**Systems Thinking in Sustainability Literature and Sustainability Syllabi**

Systems thinking is well established as an outcome of sustainability education in the literature.\(^{21}\) Sustainability educators over the course of the last decade have done much to refine what is meant by systems thinking for sustainability. Wiek et al. (2011) conducted an extensive review of the skills, competencies, and outcomes associated with sustainability education, and came up with what is now a well cited framework for sustainability competencies.\(^{22}\) The competencies that resulted from their synthesis includes systems-thinking competence, anticipatory competence, normative competence, strategic competence, and interpersonal competence.\(^{23}\) Just as with

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\(^{20}\) Donella Meadows, “Leverage Points: Places to Intervene in a System” (Sustainability Institute, 1999).


Senge’s fifth discipline, systems-thinking is a fundamental component in Wiek et al.’s framework. They write, “an intimate understanding of the inner fabric and dynamics of complex social-ecological systems is a prerequisite for identifying intervention points, anticipating future trajectories and staging transition processes.” This is not to say that Wiek et al. merely gave new names to the same old skills, abilities, and dispositions associated with critical thinking or with systems thinking. It is rather, to suggest that critical thinking, what it means to think critically, has fundamentally changed given more connected societies, and the extent of our impact, potential, and problems.

Furthermore, Arnim Wiek and his team have gone on to do more than synthesize the literature - they are actively working to link these competencies, and expand them if necessary, so that they align with the professional and civic needs of the 21st century.

Sustainability educators emphasize that systems thinking is thinking relationally. One of the better known proponents of systems thinking in sustainability education is Schumacher Reader and University of Plymouth Professor of Sustainability Education, Stephen Sterling, who writes, “If we want the chance of a sustainable future, we need to think relationally. That’s it, full stop. No need to write any more… or there wouldn’t be, if it [thinking relationally] was that obvious.” Sterling distinguishes between an established thought paradigm and the new approach that he and others take to be better suited to tackling complex or “wicked” problems: there is the reductive, deterministic, dualistic problem solving approach, and there is the integrative, holistic,

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24 Wiek et al., “Key Competencies,” 207.

25 This is work I have been engaging in with Arnim Wiek and also Shirley Vincent of the NCSE CEER.

26 Stephen Sterling, “Ecological Intelligence.” In Stibbe, The Handbook, 78
tolerant of ambiguity, approach to reframing and appreciating. Sterling suggests we need both, and we need the strategic acumen to know when to engage in which kind of thinking. How do we achieve this acumen? The same way we ride a bike, or play an instrument: with instruction and real world practice.

Within the 99 syllabi from degree granting programs in sustainability included in the sample, “Systems thinking” occurs as a phrase in 13 syllabi. The prevalence of systems thinking is considerably more extensive than this number would suggest, however, and an expanded search identified 85% of the data set as including a relevant systems thinking term. After eliminating occurrences of relevant terms that were not actually related to systems thinking, such as “leveraging assets” in a business class, roughly 63% of the syllabi were found to include a reference to systems thinking of one sort or another. These occurrences of systems thinking were analyzed for subject matter and focus, and it was found that systems thinking occurs in seven distinct areas of study:

- Disciplinary/Historical Overviews
- Techniques
- Natural/environmental Systems

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27 The expanded search included search including “leverage OR modeling OR model OR feedback OR system OR systems OR holism OR wholism OR holistic OR complexity OR paradigm OR paradigms”

28 Systems thinking OR systems approach OR applied systems thinking OR whole systems thinking OR systems science OR general systems research OR systems approach OR systems dynamics OR history of systems OR complex systems OR complex systems theory OR complex adaptive systems OR complex systems management OR sustainable systems OR resilient systems OR history of systems

29 Diagramming OR modeling OR designing OR design system OR illustrating systems OR systems analysis

30 natural systems OR hydrological systems OR ecological systems OR earth systems OR living systems OR solar system OR circulatory system OR climate systems
Systems thinking examples in the syllabi range from brief learning outcome references to more explicit descriptions of activities and methods of analysis. For example:

Apply a systems-thinking approach to address complex issues including integrating among multiple perspectives and academic disciplines.

or

What do architects and auditors mean when they describe the building as a system? Buildings have structure and function similar to that of living organisms and ecosystems. We will start with an overview of the parts and processes of a building, and we will use energy as an example to show how the parts and processes are integrated.

Systems thinking is presented in syllabi as an important new way of viewing the world and dealing with new challenges:

Awareness is the first step leading to change. It is my hope that this course will not only lead to increased awareness, but also the realization that Earth is a system of many interconnected systems and that every

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31. house as system OR built systems OR management systems OR technological systems OR anthropogenic system OR systems engineering OR energy system OR suburban systems OR urban systems OR information systems OR world systems

32. agricultural systems OR food systems (local/global/sustainable/industrial) OR farming systems OR cropping systems OR water systems OR tillage systems OR pest management system OR farming systems OR distribution systems OR economic systems OR consumption systems

33. belief systems OR public and private systems OR systems of power and privilege OR political systems OR corrupt systems OR legal systems OR court systems OR social systems OR planning and administration systems OR cognitive systems OR security and military systems OR ethical systems OR value systems OR cultural systems OR federal system

34. interconnected systems OR socio-ecological systems OR systems across time OR system consequences OR future systems OR structural and behavioral properties of systems OR relation of system parts OR system boundaries

35. 72A

36. 03A
action has far reaching effects. Awareness of the consequences of our actions will hopefully lead to change. Understanding and acknowledging such complexities is also a crucial piece to the sustainability puzzle.

Systems thinking is sometimes evident less directly; for example, in the integrated nature of the content of the course. As social-ecological systems are pushed to critical points, there are increased threats to basic human securities. Concerns around this issue have organized under the concept of the food-energy-water nexus (FEW). The nexus approach to improving food, energy and water security is a systems approach. It “integrates management and governance across sectors and scales…Given the increasing interconnectedness across sectors and in space and time…Conventional policy- and decision-making in ‘silos’ therefore need to give way to an approach that reduces trade-offs and builds synergies across sectors - a nexus approach. Business as usual is no longer an option.” 37 Integrated issues require integrated solutions. Applying systems science to food, energy and water security issues is a primary method by which researchers and policy makers are currently working toward more integrated, solutions thinking for sustainability.38 International organizations are developing conversations and conferences around the FEW nexus. 39


39 Peter Saundry reports: "In recognition of this, many groups have begun to develop strategies for research at the nexus (ACERE—Advisory Committee for Environmental Research and Education 2015) and explore integrated solutions at the nexus (The World Economic Forum Water Initiative 2011). In 2015, the US National Science Foundation (NSF) supported approximately 22 workshops which explored diverse aspects of the nexus (NCSE 2016a) in advance of launching a new initiative on Innovations at the Nexus of Food, Energy and Water Systems (INFEWS) in partnership with the US Department of Agriculture (USDA) National Institute of Food and Agriculture (NSF 2016). On January 19–21, 2016, the National Council for Science and the Environment’s (NCSE) 16th National Conference and Global Forum on Science, Policy and the Environment engaged approximately 1200 individuals from diverse disciplines.
The FEW nexus is a primary conceptualization of social-ecological systems, evident to varying degrees in sustainability education. A series of queries were run on the sustainability syllabi and program data, to discern the extent to which current sustainability education was incorporating the food-energy-water nexus in its curricula. Confirming the increase in interest in the FEW nexus within the national institutes and centers, the themes of food, energy, and water were the most commonly referenced themes or topics within the sustainability syllabi.

![Common Themes in Sustainability Syllabi](image)

**Figure 4-6. Common Themes in Sustainability Syllabi**

Examples of how food, energy and water are mentioned include:

Apply this knowledge by exploring key areas of sustainability (e.g., energy, water, food, etc.) in the regional and local context.

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Each breakout class will have five project groups, each with a different topic: Food, Water, Energy, Waste, and Transportation.

While socio-economic, institutional, and technological advances have enabled high rates of productivity growth as well as improved public health, the increasing pace of growth of urban populations is threatening to overwhelm scarce natural resources such as food, energy, and fresh water.

These topics were still more likely to occur as individual issues, rather than part of an integrated systems approach to the FEW nexus (occurrences in blue). Only 2 of the 99 sustainability syllabi reviewed explicitly mention the FEW nexus, though nearly a quarter of all syllabi include reference to food, energy, and water, only not in an integrated fashion. Among the 79 degree granting programs in sustainability that were reviewed, food, energy and water were present primarily as separate concerns.

Figure 4-7. Food in Sustainability Programs

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40 Biofuels and sustainable agriculture were the two contexts in which the nexus was referenced explicitly
Food was the most common aspect of the FEW nexus that had programs devoted to it, followed by energy. Within program descriptions, there were in most but not all cases, lists of required courses, elective courses, and learning outcomes for the
program. Queries were run to determine how components of the nexus occurred as electives, required courses, or generic program learning outcomes. Most of the food courses were elective courses, water was primarily mentioned as being involved in a learning outcome rather than a specific course, and half the energy courses were electives.

Figure 4-10. Food as Elective, Required, or Outcome
Figure 4-11. Energy as Elective, Required, or Outcome

Figure 4-12. Water as Elective, Required, or Outcome
Applying systems science to food energy and water security issues is an increasingly important approach to sustainability for policy makers and scientists alike. To understand and critically appraise a policy platform on any one of these subjects requires an integrated understanding of the nexus relationship. The FEW nexus illustrates how “sustainability science is largely a post-reductivist period of scientific research, characterized by interest and ability “to encompass different magnitudes of scales (of time, space, and function), multiple balances (dynamics), multiple actors (interests) and multiple failures (systemic faults).” This fact is driving the integration of sciences around environmental challenges. The data suggest that sustainability education has yet to fully respond to this development in systems thinking for sustainability. But there is more to the systems approach then an increase in complexity and integrated research agendas.

Beyond Natural Systems

Systems thinking works largely to integrate or unify seemingly discreet phenomena so that they can be understood relationally, and as part of larger organizational wholes. But conceptual and analytical unities are not the only goal of systems thinking. There is much to be gained from studying and comparing discreet

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systems parts as well, especially in systems that are inclusive of both social and natural systems. Following Gidden’s work on reflexivity, Westley et al. (2001) effectively discern the characteristics of social systems in particular, which can be set in comparison with ecological systems processes more generally. This is done not to take humanity out of the system; indeed, Westley et al. specify that “due to the dominance of this [human] species, its system has come close to engulfing and subsuming the natural system and should be seen as not merely a variable but a context for determining ecological processes. Another way of envisioning this is that the adaptive landscape in which species interact and compete has been transformed in its basic structure.”

Rather, what Westley and his colleagues achieve in their close consideration of social systems, is identification of the human attributes and behaviors that impact the system for good and bad. Thus, their conclusions are both disturbing and hopeful. Unlike ecological systems, social systems include humans’ ability to use symbols. Where ecological systems are entirely bounded by dimensions of space and time, social systems have hierarchies of abstraction, capacity for reflexivity, and advanced technologically driven externalization of problems.

In the first of these abilities, abstraction, one can discern the systems thinking basis for strategic change making. Abstraction allows social systems to reorganize rapidly, and this goes not just for physical organization. “The switch is done not by adaption to change in one aspect of the system but by shifting the system configuration,

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44 Ibid., 104.

in the same way a soccer team will flip between offensive and defensive alignments.”

These re-configurations are quintessential examples of systems thinkers interest in locating leverage points – places where, given a certain system, “a small shift in one thing can produce big changes in everything.”

Physicist and systems thinker David Bohm provides a foremost example of how systems thinkers emphasize reevaluation of one’s own internal path dependencies. *Thought as a System* (1994) is a transcript of dialogues between Bohm and a group of students. In dialogic, question and answer fashion, Bohm explains: “A system means a set of connected things or parts. But the way people commonly use the word nowadays it means something all of whose parts are mutually interdependent - not only for their mutual action, but for their meaning, and for existence…a system is constantly engaged in a process of development, change, evolution and structure changes, and so forth, although there are certain features of the system which become relatively fixed. We call this the structure… Then sometimes that structure begins to break up because it doesn’t work, and people may have to change it.”

Here is where Bohm begins to get at the systems faults he finds in our way of thinking. Bohm applies systems thinking to our understanding of thinking more broadly.

His solution to the faults he identifies is a renewed form of critical thinking. He continues, “We say, ‘Here is a fault. Something has gone wrong.’ But in dealing with it, we use the same kind of fragmentary thought that produced the problem, just a

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46 ibid., 108.

47 Meadows, *Leverage Points*, 1

somewhat different version of it; therefore, it’s not going to help, and it may make things worse.” So this is Bohm’s first observation - we wrongly address the faults associated with fragmentary thinking with more fragmentary thinking. “To some extent,” he continues, “relatively coherent thought has been achieved better in science than in some other areas of life. Some results flowed out of science and technology which are quite impressive - a great power was released. But now we … We just say that the use of what scientists have discovered will be determined by the needs of our country, or by my need to make money, or by my need to defeat that religion or merely by my need to show what a great powerful person I am… We don’t see our intentions are incoherent - that perhaps they are arising out of the pollution.”

Bohm is saying that the fragmentation of thought goes deeper than our inability to make connections across disciplines, or the fact that we so rarely think systematically. Thought includes feelings, desires, intentions, and whatever degree to which we will articulate the reason for our will. Thought can enable thinkers to position themselves within the system, to identify potential agency, and actual responsibility. It is opportunity, and it is analysis.

Systems thinker Donella Meadows wrote one of the better-known considerations of leverage points for change. In it she goes down a list from the least to the most effective leverage point for change. The most effective leverage point, like the reconfigurations of system orientations described by Westley et al., is to generate the power to transcend paradigms. She writes, “There is yet one leverage point that is even higher than changing a paradigm. That is to keep oneself unattached in the arena of paradigms, to stay flexible, to realize that no paradigm is “true,” that everyone, including

49 Ibid.
the one that sweetly shapes your own worldview, is a tremendously limited understanding of an immense and amazing universe that is far beyond human comprehension." Meadows makes this point not to express a diminished hope in humanity’s ability to find successful ways of thinking and strategies for success. That would be a false and cynical understanding of the sustainability dictum, *there are no silver bullets*. Rather, Meadows is pointing out that there are no fixed limitations to humanity’s ability to draw on a seemingly endless range of ways to understand the world. The job of systems thinkers is to understand context well and richly enough, to have goals in mind clearly enough, to know which paradigm, which re-configuration, is needed for which situation. The systems view makes explicit the human ability to speed up change and adaptive processes, through cultural intervention - cultivation through education and shifting through communication of world views, and the achievement of novel and creative approaches to situations. 51

This optimistic vision is problematic on at least two fronts. First, the argument can be made that thus far humans have done a poor job at understanding the long-term consequences of their actions. They’ve made decisions largely to short term effect, leaving the long game to other generations, or not bothering to consider the long-game at all. Second, the scope of understanding has changed such that systems thinking includes social systems, and so includes values and morality, and cultural influences in analyses, and in practical implementation for sustainability. What does it mean for


51 "Humans are unique in that they create novelty that transforms the future over multiple decades to centuries. Natural evolutionary processes case the same magnitude of transformation over time spans of millennia." Gunderson and Holling, *Panarchy*, 118.
sustainability education to be more inclusive of values education? And what are the challenges of this approach for systems thinkers? Critical systems thinking is an analytical tool and it is also a reflective tool. The fact that systems thinking is so commonly linked with specific environmentalist worldviews, and with systems thinker agendas that work explicitly to change world views is one reason sustainability education and its commitment to developing systems thinkers is sometimes attacked or seen as complicit in a form of education that is indoctrinating rather than freeing.  

This call for challenging existing paradigms and worldviews is open to attack from those who would charge sustainability education as an agenda for indoctrination above and beyond its mission of empowering education. The obvious way to enrich a systems thinking interaction with worldview and paradigms is through the inclusion of strong critical thinking skills. As the following section shows, however, critical thinking is itself ambiguous, and in some disciplinary contexts, less about empowering individuals and more about socializing them to a specific methodology.

A number of educators and theorists of sustainability have developed strategies to distinguish between educational efforts that are empowering and those that are indoctrinating. In a 2002 article Arjen Wals and Bob Jickling, write that “critical thought depends on transcendent elements in ordinary language, the words and ideas that reveal assumptions and worldview, and the tools to mediate differences between contesting value systems.” In order to distinguish between types of sustainability

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education, Jickling and Wals first suggest to apply Lorrie Shepard’s (2000) distinction between transmissive/authoritarian education and socio-constructive transformative education. They developed a quadrant diagram that shows the possibilities and extent of freedom, as they perceive it to exist across these approaches.

Tina Evans’ (2011) dissertation on the pedagogy and praxis of sustainability education suggests that a version of systems thinking is well aligned with critical thinking. Conversely, thinking that does not engage with power, argues Evans, can only superficially inform action. “When system functioning is described as more or less autonomous, however, direct critique of the uses and abuses of social power tends to slip into the background, along with discussion of human agency. Detailed explanations of principles of system functioning can impart an almost autonomous quality to systems, as though emergence and other forms of system change operate outside human history, only minimally, if at all, influenced by human choice and action.” For Evans, included among the uncritical versions of systems thinking are those that call for people to change their world view, but to do nothing more, and those that do not recognize the structural constraints that exist in our society and in our institutions that hinder the ability to act with more holistic understanding. The problem, effectively, is that this kind of abstract systems thinking takes the observer, the person doing the systems thinking, out of the system; hence the loss of agency.

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Contemporary systems thinkers recognize this dilemma, and stress the role of the system observer. Stroh (2015) for example, writes, “For any complex problem to be solved, the individual players all need to recognize how they unwittingly contribute to it. Once they understand their own responsibility for a problem, they can begin by changing the part of the systems over which they have the greatest control: themselves.” Stroh calls this systems thinking’s “emphasis on responsibility and empowerment.”

These educators emphasize that systems thinking is not a simple technical skill, and that it benefits from a form of critical thinking, in which the thinker accounts for a broader range of behaviors and consequences. Still, of all the buzz words and ambiguous learning outcomes of contemporary education reform parlance, critical thinking is perhaps the most important, and the most troubling.

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56 Stroh, Systems, 18.

57 Ibid. Also, Sustainability educators can include personal responsibility in the most unlikely of courses. For instance, “a collaborative project between the University of York-based Green Chemistry Network and the University of Bradford Chemistry Department is also developing similar materials to encourage life cycle thinking amongst students and develop their competency in systems thinking. This involves taking standard undergraduate practicals using solvents and then providing a green chemistry variant so that students can compare both their performance in use (yield) and their differing environmental impacts across the full life cycle (manufacture, use and disposal). For example, a standard undergraduate practical involves preparing silver complexes using various methods. One stage requires vacuum filtration and washing with three solvents, water, ethanol and ethoxyethane. In the modified experiment only one solvent will be used to compare overall efficiency. Students will be provided with background on the toxicity and environmental impacts of the different solvents as a basis for judging the benefits of reducing solvent usage versus changes in efficiency. These approaches are intended to integrate “ecological systems thinking” into traditional chemistry activities in ways that are meaningful, forward looking and relevant to future employment prospects. They require students to apply traditional analytical and evaluative skills and competencies but within a broader frame of reference. Peter Hopkinson, and Peter James. “Practical Pedagogy for Embedding ESD in Science, Technology, Engineering and Mathematics Curricula.” International Journal of Sustainability in Higher Education 11, no. 4 (September 21, 2010): 365–79.
Critical Thinking

According to a recent survey conducted for the Association for American Colleges and Universities, 81% of employers consider critical thinking to be a “very important” trait of their new employee hires. And yet, according to David Perkins, research professor of teaching and learning at the Harvard Graduate School of Education, critical thinking is “a flat-out ambiguous term…Some people use it to mean skills or argumentation and evidence, while others mean good thinking in general, even including things such as creativity.”

Multiple studies over the past fifty years confirm Perkins’ observation that little rigorous education in critical thinking is occurring in US colleges and universities. The Arum and Roska study (2011) found that there was a great deal more identification of the importance of critical thinking than there was actual teaching for critical thinking. Similarly, the state-wide study for the California Commission on Teacher Credentialing (1997) found that, “although the vast majority of faculty in both public and private colleges and universities across California believe critical thinking to be of primary importance to instruction (89%), relatively few can articulate a reasonable conception of it (19%), and only 9% clearly teach for critical thinking on a typical class day.”

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From this apparent discrepancy between the rhetoric and practice of so many college and university educators, follows a need for slow and careful explanation for any given use of the term critical thinking. So that the reader might understand critical thinking not as a static learning outcome, but as a skill set that has adapted over time, the chapter means to establish clarity and consistency in its conception of critical thinking, before moving on to describe an emergent conception of critical thinking, updated for the 21st century, which is here called critical systems thinking.

Critical thinking is a foundational skill set in liberal arts education, and is also commonly identified as a learning outcome in technical and technological programs as well. Most generally speaking, it is a disciplined art that means to ensure that one uses the best thinking one is capable of in any set of circumstances. Critical thinking involves a thinker improving the quality of thought and degree of understanding “by taking charge of the structures inherent in thinking and imposing intellectual standards upon them.”

Philosophers of education connect critical thinking with Socratic education in the early dialogues of Plato. The Socratic method of questioning and answering, which can be called dialectic, is a way of modeling the process of critical inquiry for one’s interlocutor. According to the Platonic dialogues, Socrates was critical of how education was achieved in his time. Whether it was being practiced by poets, sophists, or otherwise, “each of these purported educators inculcates behavior and transmits

62 Ibid., 35.

logoi to the passive pupil…” Socrates, in contrast, does not state views because he does not want to be one more new authority who stifles dialectic. Critical deliberation is a way to stimulate further questioning on a subject or idea, in the hopes of further clarifying and supporting a position. The goal is the relative achievement of a well-reasoned, expressed and supported truth.

Critical thinkers interrogate assumptions and the factual basis of arguments, including one’s own arguments, to identify and assess the quality and consequence of different opinions, values, goals and explanations. Philosopher Robert Ennis has written on critical thinking for more than 30 years. His parsimonious definition of critical thinking (1990) is, “reasonable reflective thinking that is focused on deciding what to believe or do.” Creative acts, such as forming hypotheses, alternative ways of viewing a problem, questions, possible solutions, and plans for investigating something, come under this definition. Ennis’ definition emphasizes reflection, reasonableness (interpreted roughly as rationality), and decision-making (about belief and action). These are key action words for moving toward critical thinking as a practically implementable skill. Critical thinkers clearly perceive and fairly interpret both what is said and done and the world to which these beliefs and deeds refer. This involves the critical thinker in a process of systematic fact-checking, analysis, and inference, employing logical mechanisms such as deduction and induction as well as qualitative interpretation, to determine the accuracy, consistency, reliability, relevance and meaning of the evidence at hand, the

64 Ibid., 7.
65 Ibid.
arguments that are marshaled, the assumptions, beliefs, and values behind the arguments, the decisions reached, and the goals pursued.

The Delphi method was employed (1990) to arrive at a consensus definition of critical thinking, resulting in the following description: "The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit."

The statement of expert consensus on critical thinking identified critical thinking as including cognitive skills in interpretation, analysis, evaluation, inference, explanation, and self-regulation. Elsewhere, the same authors that reported on the consensus statement describe the disposition of critical thinking to include: Inquisitiveness: a measure of intellectual curiosity and desire for learning; Systematicity: the use of orderly, focused, and diligent process in the inquiry stage; Analyticity: the use of reason and evidence to resolve problems; Truth-seeking: honesty and objectivity with findings, even if they do not support one’s own beliefs; Open-mindedness: tolerance of divergent views; Self-confidence: trust in one’s own reasoning powers; and Cognitive maturity: recognition that some problems have more than one option.


Daniella Tillbury’s (2004) introduction to sustainability education affirms the role of critical thinking, which “allows us to uncover how our culture shapes our deepest held personal values and beliefs so that we can grasp both the personal and cultural dimensions of the many complex problems of sustainability. In doing so critical thinking provides new inspiration for contributing to change in genuinely autonomous and authentic ways.” Critical thinking works across disciplines and subject areas. It is foundational to both the scientific method and interpretive analyses of texts and discourse, and supportive of procedures for democratic deliberation.

Critical thinking requires a sharp mind but also an open mind, willing to consider the perspectives of others. Critical thinking can be supportive of institutional reform, since it potentially identifies and chips away at poorly functioning path dependencies and denies attempts to legitimate knowledge that are based solely on existing authority and embedded but corrupt uses of power. Lastly, critical thinking requires self-reflexivity, as one’s own convictions and biases are recognized and their impact on the interrogatory and evaluative process are taken into account. It demands and cultivates open-mindedness, fairness, and humility as alternative perspectives—both presented and imagined—are considered and the critical thinker’s own assumptions, beliefs, values, decisions, and goals are amended.71

70 Daniella Tilbury and David Wortman, “Engaging People in Sustainability” (Gland, Switzerland: World Conservation Union, 2004).

71“Achieving a truly fair-minded state of mind is challenging. It requires us to simultaneously become intellectually humble, intellectually courageous, intellectually empathetic, intellectually honest, intellectually perseverant, confident in reason (as a tool of discovery and learning), and intellectually autonomous.” (Paul and Elder, Critical, 41.)
Roughly 21% of the sustainability syllabi in the sample make explicit reference to the term “critical thinking.” These syllabi often involve students working “to critically evaluate proposed solutions and policies designed to reduce the negative impact of human society on the natural environment.” Sometimes these syllabi set out specific guidelines for students:

- What is the central point made by the article (or articles)? What did you most agree with? What did you find least persuasive or confusing? What, if anything, did you most disagree with?

Other times critical thinking is mentioned as a learning outcome at the start of the syllabus, but little else is said about it. And some syllabi float between these two extremes, suggesting but not actually explaining how critical thinking functions in the course. These sorts of explanations contain unclear phrases like “manipulate concepts” and “grasp of the material.”

Expanding beyond the specific term “critical thinking” to include related terms, the search returned roughly 70% of all sustainability syllabi. Many of these included a critical thinking activity or assessment, such as “analyzing a case” or “evaluating a potential solution” or “assessing specific green practices.” These activities in nearly all cases are presented without rubrics for successful completion. Thus, critical thinking in

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72 01A

73 68F

74 “Promoting critical thinking about social and environmental ethics.” 05A

75 For example, “This is a critical thinking course. Your grasp of the material and ability to manipulate the concepts will be evaluated from your contribution to class discussions (and our concept map, to be explained in class) and weekly blog posts, which will be kept internally 72A

76 The expanded search included the terms critically OR critical OR analyze OR evaluate OR assess OR debate OR judge
the sample is relatively aligned with Paul, Elder and Bartell’s (1997) findings that critical thinking is seen as a vital and prominent learning outcome, but is also rarely articulated or practiced in depth.

There are at least three major instruments that measure critical thinking. These include the California Critical Thinking Test, the Cornell Critical Thinking Test, and the Watson-Glaser Critical Thinking Appraisal. While some of these tests include essays and qualitative assessment, they are largely composed of multiple choice questions. Despite these instruments, research suggests that it is nearly impossible to effectively measure the success of courses or programs designed to improve critical thinking. Instead, the research has shown only that programs that integrate ideas and concepts across courses along with more interdisciplinary courses show the highest gains in critical thinking. In a 2011 review of 42 empirical studies of critical thinking in higher education, it was found that most quantitative studies of critical thinking were wanting in design, sample size, or sample representativeness. It was also recommended that researchers employ more qualitative research design methods to get at important information not revealed in quantitative measures, and statistical significance should not be the only criterion for such studies.

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Critical Thinking and Critical Pedagogy

Critical pedagogy, as an approach to teaching and learning, identifies and takes responsibility for the social effects of education as a discursive system within a historical context. Its goal is a critical democracy where individuals are empowered to engage in the processes of social transformation necessary for self-betterment. According to critical pedagogues, for a society to be just, engaged democratic processes should be cultivated and available to all. Paulo Freire grew up amidst great poverty, was imprisoned for his political work, and spent nearly sixteen years in exile. He designed and implemented a political, educational project that meant to develop people’s critical consciousness, conscientização, which is “the deepening of the attitude of awareness characteristic of all emergence.” He believed in the possibility for people to emerge from their slumber of oppression, and the development of their critical consciousness, via liberating education, as leading to the development of each person’s ability to intervene and improve their situation.

Since Freire’s death in 1997, Henry Giroux has most prominently carried forward the theory of critical pedagogy. His forty-some books deal extensively with the educational facets of politics and culture. Blending Frankfurt School critical theory, Foucault’s power analytics, depth-psychology and contemporary cultural studies, Giroux maintains, as Freire before him, that education occurs not only in schools, and also that

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schools must be designed and defended as democratic public spheres.\textsuperscript{82} John Huckle has applied critical pedagogy to the political and environmental project of educating for sustainability. He sees the engaged citizenship of critical pedagogy akin to the greater self-governance necessary for people to responsibly contribute to a more sustainable society.\textsuperscript{83} Like Freire, Huckle describes a dialectical approach to education, in which students identify and articulate processes, and develop a personal praxis. Praxis is what Freire calls “the authentic union of action and reflection.”\textsuperscript{84} Also like Freire, Huckle believes local and tacit knowledge must contribute to the technical solutions of academics and experts.\textsuperscript{85}

C.A. Bowers admits to the ability of critical pedagogy to highlight injustice within institutional settings, but questions how this pedagogy might reinforce the dominant liberal paradigm of individuality and fragmented rationality.\textsuperscript{86} More aggressive criticisms include the notion that the terms and rationale of critical pedagogy actually perpetuate the very forms of oppression they mean to address, primarily by the way this theory abstracts the issues to its concepts, and emphasizes solutions based on a critical


\textsuperscript{84} Freire \textit{Pedagogy}.

\textsuperscript{85} Huckle, \textit{Suggested}.

\textsuperscript{86} C. A. Bowers, \textit{Educating for an Ecologically Sustainable Culture: Rethinking Moral Education, Creativity, Intelligence, and Other Modern Orthodoxies} (SUNY Press, 1995).
rationalism. And also the theory is criticized for being heavily laden with social visions but nearly devoid of specific instructional practices. With this historical development and its contemporary criticisms in mind, critical pedagogy can be summarized as an educational approach to social transformation rooted in:

- Awareness of the structures of power at work in cultures and especially in the formation and transmission of knowledge
- A more egalitarian, less top-down, co-production of knowledge by learners and teachers
- An educational praxis of theory, application, evaluation, and reflection, with the goal of a just society.

The two-part transformation of self and society as it is understood to occur by critical pedagogues is dramatically distinct from the form of critical thinking that now occupies much student time in the conventional political science classroom. Following the first bullet point, critical thinking in this regard always includes a consideration of the functions and flows of power. Following the second, it recognizes that students are shaping the future, not just being socialized into the present. Following the third bullet point, it recognizes that reflection is a vital component of socially just pedagogies, for both teachers and students. Lastly, critical thinking is not just about logical reasoning, it also involves “value development to enable citizens to make their own contribution to society in a critical manner, with sensitive awareness.” There are always implicit value commitments in learning situations, but the value commitments of critical thinking are often hidden under a strict division between facts and values.

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Critical thinking manifests differently depending upon the disciplinary or interdisciplinary literature which one chooses to consider. Civics education at the higher education level is often situated within political science programs, and within political science programs critical thinking is the most prominent learning outcome. Civic learning benefits from critical thinking practice. But contemporary manifestations of critical thinking in political science classrooms often rely on a disciplinary, methodological approach to critical thinking as practice in a specific version of the scientific method. The idea that students should have the courage to speak up and challenge the conventions of the discipline goes against the grain of some political science pedagogy, even in courses committed to critical thinking. Much mainstream political science pedagogy works to keep the political impersonal. For example, Marks (2008) writes, “learning in the political science classroom can be enhanced by emphasizing scholarly discussion and critical thinking while reducing opportunities for students to personalize classroom discussion… The problem with a politicized classroom is that it gives students a false impression of what constitutes the study of politics and the discipline of political science. When scholars study politics they are engaged in an investigation into the dynamics of governance, not a debate over personal political beliefs. Additionally, political science is about methods of inquiry, not argument or debate. When students are more concerned with “making a point” or

89 In a web survey of undergraduate political science programs in the United States, critical thinking was by far the most cited skill outcome (n=72); 45% of programs cited critical thinking. reported in Olsen, Jonathan, and Anne Statham. “Critical Thinking in Political Science: Evidence from the Introductory Comparative Politics Course.” Journal of Political Science Education 1, no. 3 (September 2005): 323–44. doi:10.1080/15512160500261186.n=72; 45% of programs cited critical thinking. reported in Jonathan Olsen and Anne Statham, “Critical Thinking in Political Science: Evidence from the Introductory Comparative Politics Course,” Journal of Political Science Education 1, no. 3 (September 2005), 323–44.
winning a debate, they may erroneously equate the art of rhetoric with the social science skills that are part of the disciplinary practice of political science."  

Similarly, Olsen et al. argue “that a definition of critical thinking, if it were to be effective, would have to move down the “ladder of abstraction” to reflect largely discipline-specific concerns.”  

Marks argues for the benefits of limiting students’ reliance on their personal beliefs. This may well introduce students to the discipline of political science, but it does so by divorcing political science from its historic mandate to promote active citizenship and even dissent.  

While it may be true that the scientific method and its application to political issues does require a degree of objectivity and an avoidance of strong ideological positions, it is also true that political scientists study social phenomena that are often made up of the very variables that they would eliminate in their own classroom.  

Student awareness of social complexity can be enhanced when a diversity of student perspectives is engaged with openly and friendlily, so that each student’s perspective can be better informed, so that students can engage in deliberation and even heated discussion and debate, not simply toward “making a point” or winning a debate, but as a form of experiential practice regarding their critical thinking skills.  

Emphasis on a wholly disciplinary approach to critical thinking lacks an ability to apply

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92 Farr and Dryzek, *PS in History*.  

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critical thinking to inter-and transdisciplinary problems that exceed the confines of any one disciplinary lens.

Environmental scientists and environmental educators have taken at least two approaches to linking studies of environment with critical thinking. The first, involves examinations of the extent to which environmental education situations are conducive to the achievement of critical thinking. To this end positive correlations have been found between the achievement of critical thinking and exposure to environmental education in Florida high school students. Alternatively, others have worked to reconceive what is meant by the term critical thinking, given the newly defined needs of environmental science, as societies face increased uncertainty and complexity. While sustainability means more than environmentalism and the management of natural resources, these concerns are still primary to the cause and interest of sustainability and sustainable development education initiatives. For environmental scientists, this has resulted in a new conception of the critical thinking skill set, with a primary concern “to develop students’ capacity to confront uncertainty, which is characteristic of the complex systems environmental scientists encounter in their professional practice.”

93 Research suggests that environmental education can lead to improved critical thinking and dispositions to critical thinking, understood as: Interpretation: categorization, decoding significance, clarifying meaning; Analysis: examining ideas, identifying and analyzing arguments; Evaluation: assessing claims and arguments; Inference: querying evidence, conjecturing alternatives, drawing conclusions; Explanation: stating results, justifying procedures, presenting arguments; and Self-regulation: self-examination, self-correction. Julie Ernst and Martha Monroe, “The Effects of Environment-based Education on Students’ Critical Thinking Skills and Disposition Toward Critical Thinking,” Environmental Education Research 10, no. 4 (November 2004), 508. 509.

uncertainty through receptive and adaptive learning traits is a key component of the shift from critical thinking to critical systems thinking. Having achieved a thorough review of the literature relevant to both systems thinking and critical thinking, the chapter now advances to discussion and empirical analysis of critical systems thinking in the sustainability classroom.

**Critical Systems Thinking in Sustainability Learning Outcomes**

The preceding review of critical thinking and systems thinking provides a foundation for this dissertation’s interest in an emergent form of cognitive skills development for 21st century citizenship – critical systems thinking. The critical systems thinking skill set integrates critical thinking’s sensitivity to power and structure with systems thinking’s capacity to model and communicate the complexity of contemporary socio-ecological situations. The following analysis focuses upon the stated learning outcomes of sustainability syllabi, as a means of identifying the characteristics of courses that might be understood as including, to greater and lesser degrees, practice in critical systems thinking. Hasslof and Malmberg’s (2015) strategy for analysis of critical thinking and the ends of education for sustainability is the methodological starting point for this investigation. They build off the work of educational researcher Gert Biesta (2009), who’s framework for learning outcomes specifies three ends of education: qualification, socialization, and subjectification.

Qualification provides students with “knowledge, skills, and understanding and often also with dispositions and forms of judgement that allow the student ‘to do

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something’ - ‘a doing’ which can range from the very specific (such as in the case of training for a particular job or profession, or training for a particular skill or technique) to the more general (such as in the case of the introduction to modern culture or Western civilization, the teaching of life skills, etcetera). . . . This is particularly, but not exclusively, connected to economic arguments, i.e., to the role education plays in the preparation of the workforce.”

In terms of critical systems thinking, qualification includes but is not limited to improvements in political literacy, knowledge of governing bodies, modelling and mapping situations and problems for improved understanding of complexity.

With socialization students become “part of particular social, cultural and political orders.” Sometimes socialization is actively pursued by educational institutions, for example with regard to the transmission of particular norms and values, in relation to the continuation of particular cultural or religious traditions, or for the purpose of socialization into a specific work culture or organizational ethos. Even if socialization is not the explicit aim of educational programs and practices, it often still functions to, “. . . insert individuals into existing ways of doing and being, and, through this, plays an important role in the continuation of culture and tradition.”

The chapter has more to say further below, on the fact that socialization functions in this regard to desirable and undesirable ends.

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97 Ibid., 40.

98 Ibid.
Lastly, subjectification is Biesta’s term for educational processes of identity development. He focuses on identity development as individuation, specifically processes that he deems empowering and conducive to the development of unique individual ways of being in the world: “[I]t is precisely not about the insertion of ‘newcomers’ into existing orders, but about ways of being that hint at independence from such orders; ways of being in which the individual is not simply a ‘specimen’ of a more encompassing order…. any education worthy of its name should always contribute to processes of subjectification that allow those being educated to become more autonomous and independent in their thinking and acting."99 It is important to stress that while, for Biesta, subjectification is a positive process leading to individuation, this chapter takes a more critical approach to subjectification. In some instances, it functions to support an empowering and freeing kind of individuation as Biesta suggests, but in other instances it functions to actively shape that individuation, which grays the boundary between subjectification and socialization.

Challenging existing paradigms and looking for epistemological leverage points for change are skills practices associated with subjectification. Also reference to social class structure, inner power workings, and invitations to critique the existing order are subjectification. Challenging and interacting creatively with worldview are understood as subjectification. Sometimes learning outcomes are phrased to highlight the spirit of inclusivity and a democratic ethos of pluralism. Other times learning outcomes suggest that a specific world view is important or necessary; for instance, a learning outcome

99 Ibid., 39-41.
that highlights ethical holism not as one among many possible world views, but which presents it as the most important solution to specific ecological problems.  

Subjectification, therefore, within critical systems thinking courses, is potentially, but not necessarily, a way that the observer is brought back into the systems model, ensuring a critical systems thinking rather than a false objective modeling of phenomena without or with little inclusion of human agency factors. Subjectification can also be a veiled form of socialization – inviting students to develop their own worldview, but highly suggestive of what that worldview should entail.

Thus, roughly following the strategy laid out by Hasslof and Malmberg, the systems thinking inclusive courses were coded for Biesta’s three outcomes of qualification, socialization, and subjectification. Speaking in terms of positive learning outcomes, qualification increases a person’s capabilities, socialization provides context and embeddedness, and subjectification improves awareness and ability for self-development regarding perspective and how perspective or worldview is changing and growing. Based on the analysis of categories of systems thinking, as detailed above, a coding scheme for distinguishing learning outcomes was developed, and this coding

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100 Ethical holism is “the position that moral significance attaches to wholes over and above the individuals they include, or the idea that environmental wholes can and do matter morally and directly, or that they possess intrinsic value. Sometimes when we point to the holism of an ethical system, or the desirability of holism, this is what we are pointing to or looking for: we are exploring or desiring a system that allows us to directly morally include species, ecosystems, watersheds, biotic communities, or entities we typically consider collectives.” (Michael P. Nelson, “Teaching Holism in Environmental Ethics,” *Environmental Ethics* 32, no. 1 (2010), 41.)
scheme was applied to code course descriptions and learning outcomes from the 62 syllabi that included a systems thinking component\textsuperscript{101}.

<table>
<thead>
<tr>
<th>qualification</th>
<th>socialization</th>
<th>subjectification</th>
</tr>
</thead>
<tbody>
<tr>
<td>holistic understanding of complexity and design knowledge and ability to comprehend and work with complex adaptive systems, including ability to model and/or map complex scenarios with feedback, looping, potential cascading, and incorporating past and future, and multiple scales (for example, human-ecological interactions, business development, ecosystem recovery strategies, building design and energy savings, local food system development, value-chain development. stock and flow diagramming and mathematical modeling.</td>
<td>introduction and reinforcement of contemporary visions and existing paradigms, including world system, sustainable development, sustainability, federal government, legal and court systems, scientific paradigm, entrepreneurial/innovation paradigm, industrial agriculture paradigm, and representative democracy</td>
<td>interaction with mental models, ethics, values, belief systems, world views and perspectives; working to identify leverage points for change in systems that have resisted change, reflection on uncertainty, social complexity, and interaction with culture; identification of systems of power and privilege.</td>
</tr>
</tbody>
</table>

Figure 4-13. Qualification, Socialization, and Subjectification

There are limitations to the ability of content analysis to reveal these outcomes in syllabi, as it is the case that what is in the syllabi is not exhaustive of what occurs in

\textsuperscript{101} The coding process was not so simple as assuming that each syllabus was either oriented toward qualification outcomes or socialization or subjectification outcomes. The following passage exemplifies the ways these three outcomes might be apparent in a single course description: (color coded)

Blue=socialization
Red=qualification
Green=subjectification

This course examines the relationship of human society to the natural environment from the perspective of sustainability, defined as meeting the needs of the present generation while preserving the ability of future generations to meet their needs. Using a multi-disciplinary approach, we will consider how values, paradigms, policies, technologies, and their interactions determine our currently unsustainable relationship with nature. We will also explore different approaches for moving society in an environmentally sustainable direction. We will examine issues of society, environment and sustainability from several points of view. First, we will see the interconnections of society, culture, economy and nature by focusing on a case study of the Ladakh people in the Kashmir area of India and a shorter case study of Curitiba, Brazil. Second, we will examine the inter-connectedness of society and environment in the context of systems thinking. This approach connects behaviors, goals, values, and resources with systems, particularly in terms of feedback effects. Finally, we will consider how the ways we live and behave will need to change – in order to create a resilient and sustainable relationship with eco-systems and the earth.
actual courses. It may be that educators building new courses will include in the syllabi more references to the latest skills, even though they are unsure how much they will actually be able to achieve in the courses, and it may be the case that other educators do not rely on a syllabus to communicate all aspects of a course, and instead treat it only as a reading list. One could argue that what I find in this analysis is not evidence of classroom practice, but only the depiction of sustainability education as it occurs in syllabus. This research assumes, however, that any outcome considered to be important or key to a course will be included in the learning outcomes of the course. These documents, for better or worse, still serve as the most available and referenced artifact of classroom practice, alongside participant observation.

**Results**

Measuring the amount of coverage of each type of outcome and rounding to the nearest whole number, qualification outcomes are four times more prevalent than socialization or subjectification statements within syllabi that include a systems component.\(^\text{102}\) This was expected, as qualification is the category aligned with the prevailing skills and competencies outcomes discourse in education literatures, and with the technical training that is most highly valued in common public and policy discourses.

\(^\text{102}\) Coverage is a measurement of how much of the actual text of the syllabi is concerned with each category. For qualification, for instance, 4% of the total text in all the syllabi that include a systems thinking component are qualification statements.
Exemplary qualification statement:

- increase familiarity with some of the major scientific, social and economic issues behind our understanding of "sustainability"
- combine knowledge of sustainability from natural systems, built systems, and the areas in which these systems overlap –
- apply knowledge gained about the impacts of human activities on natural systems and resources to given scenarios\textsuperscript{103}

Far less common were socialization statements. It is here (and in subjectification statements) that there appeared to be the greatest potential for building upon Biesta’s framework. For example, in the following socialization statement, the learning outcome means to introduce the student to the professional culture of social entrepreneurship, and specifically how this culture functions in the context of a given university environment:

Through student designated and designed projects, we will work to raise awareness of Social Entrepreneurship, learn more about the work of

\textsuperscript{103} 04A
successful social entrepreneurs and why their models work, as well as expand efforts of positive social change going on at _____, and beyond.\textsuperscript{104}

Socialization becomes professionalization in a largely secular and vocational setting. The content analysis did not find a single socialization-oriented learning outcome that was oriented toward civic behavior. Furthermore, the gray area between socialization and subjectification was numerous times apparent:

A fifth objective is to explore God’s non-human creation from an ecological standpoint and reflect on it as scientists who hold religious beliefs. While many areas of biology can lead to an increased appreciation of Creation, I believe ecology with its broad study of the interactions between living organisms and their environment can provide particular insights into the wonder and complexity of the world around us.\textsuperscript{105}

Here the key statement, “reflect on it as scientists who hold religious beliefs” reveals that there is a combination of socialization and subjectification occurring; that, perhaps, subjectification is being explicitly colored by socialization.

In coding subjectification it became apparent that two different forms of subjectification could be discerned within the learning outcomes. The first, understood here as soft subjectification, include reference to pluralism, perspective and ethics. Hard subjectification, conversely, make explicit reference to self-development and personal meaning making processes.

Almost twice as many subjectification occurrences within the syllabi were “soft” as were “hard”. That is to say, subjectification occurred primarily as an implied reference to world views and the perspective of others, and far less often made reference to development and challenges to one’s own worldview.

\textsuperscript{104} 02D
\textsuperscript{105} 38B
Hard subjectification occurrences were concerned most often with students developing their individual value system and world view; this is the form of individuation Biesta means to identify. Some of the hard subjectification syllabi concerned shifts in world view for a predetermined end, which might be seen as a less individuated, more socialized form of subjectification. Thus, subjectification learning outcomes occurred in four forms: soft and open, soft and closed, hard and open, and hard and closed.

An example of a soft and open subjectification statement:

To understand and think critically about concepts key to food systems including: systems thinking, power and politics, normative thinking, tradeoffs and unintended consequences, and community embeddedness.\textsuperscript{106}

An example of a hard and closed subjectification statement:

The student cultivates the values necessary to become humane stewards of their communities and our world\textsuperscript{107}

An example of a hard and open subjectification statement, which is most aligned with Biesta’s concept of individuation:

“Developing a clearer understanding of, and commitment to, personal values."\textsuperscript{108}

The hard subjectification occurrences were fairly evenly split between those that were open and those that were closed.\textsuperscript{109} Thus, within the sample it was most common that subjectification learning outcomes are general references to a diversity of worldviews and perspectives, and where a single worldview or approach is mentioned, it

\textsuperscript{106} 68P
\textsuperscript{107} 21A
\textsuperscript{108} 33C
\textsuperscript{109} 10 were open and 9 were geared toward a specific end or worldview.
was no more likely for subjectification learning outcomes to be supportive of processes of individuation as it is for them to be suggestive of a predetermined identity outcome. When subjectification did occur in sustainability syllabi that include a systems thinking component, it was most likely to be found in courses where exams composed less than half the total grade for the course.\textsuperscript{110} This suggests that non-technical courses were more likely to include subjectification outcomes.

![Subjectification Outcomes Occur in Courses Where Exams Count for Less](image)

**Figure 4-15. Biesta Outcomes by Emphasis on Exams**

This finding is confirmed in another query. Figure 4-16 shows the common occurrence of socialization outcomes, across subject matter, whereas subjectification outcomes of systems thinking courses were most common in overview, economic, and social science and humanities type courses. This suggests that overview courses are the site where students are either given the opportunity to develop their perspective and

\textsuperscript{110} Regarding the overall lack of emphasis upon exams, recall that this data reflects only those courses that include systems thinking, not the entire sample of syllabi. Apparently, systems thinking-inclusive courses are less prone to exams, overall.
worldview on relevant issues, or where the paradigmatic worldview or frame for the discipline is substantiated.

Figure 4-16. Biesta Outcomes by Course Type

Within subjectification outcomes, overview and economic courses tended to include soft subjectification, and when these were hard subjectification, they tended to be open. There was only one environmental course that included subjectification, and it was hard and closed. The courses in the social collection were far more likely to have hard subjectification outcomes and these were more likely to be closed, which is to say including a predetermined worldview.

Figure 4-17. Subjectification Hard or Soft
Within the social sphere courses, the political science courses had the highest rate of hard and closed subjectification, though this rate was matched by the rate of hard and open subjectification outcomes in political science courses.

The social sphere of sustainability is arguably most concerned with justice, but it appears the justice lens is a bit of a double edged sword, and student encounters with strong subjectification learning outcomes might prepare them for justice work, or these courses might themselves enact a form of injustice upon their students, uncritically imposing upon their students a world view or perspective framing that does not account for or represent the interests and perspectives of those students, or for that matter, the emergent needs of the situation that is yet to unfold.

Lastly, those courses that managed to integrate all three outcomes were examined to surmise how a holistic approach to systems-inclusive course outcomes might be informed. Among other things, it was discovered that courses from bachelor of arts programs were far more likely than bachelor of science programs to include all three of Biesta’s outcomes. Eleven programs included qualification, socialization, and subjectification outcomes, and eight of these came from the eighteen B.A. programs included in the systems-inclusive set, and three of these came from the thirteen B.S. programs included in the systems-inclusive set. Further confirming this trend, of the
systems-inclusive courses that included all three outcomes, nine came from the sixteen liberal arts colleges included in the systems-inclusive set, and two came from the six research universities included in the systems-inclusive set. Bachelor of arts degree programs from liberal arts colleges were more likely to have courses that include systems thinking coursework that integrates qualification, socialization, and subjectification learning outcomes.

Figure 4-19. Integrating Biesta’s Outcomes by Degree Type

Figure 4-20. Integrating Biesta’s Outcomes by Institution Type
Discussion

Biesta’s point in developing these categories is not that there needs to be more of one outcome or another. Rather, he means to embed a more rigorous and developed qualitative method for analyzing learning outcomes. Hasslof and Malmberg (2015) employed Biesta’s method to locate an emphasis on critical thinking within sustainability educator’s reflections on their own practice. Biesta’s framework enabled Hasslof and Malmberg to specify how sustainability educators are conceiving of critical thinking in terms of qualification, socialization, and subjectification. The authors argue that scientific discourse and its sometimes singular emphasis on “reasoning with arguments built upon scientific knowledge and logical reasoning” might frame otherwise helpful ethical and political considerations as illegitimate or outside the purview of critical thinking.

This chapter applied Biesta’s framework to systems thinking in sustainability syllabi and worked to specify how the subjectification dimension of systems thinking courses do or do not promote personal reflection and meaning making. Critical systems thinking might through careful crafting of subjectification learning outcomes improve higher education’s accommodation of various evidence and knowledge types, including the value systems of underrepresented stakeholder groups. Critical systems thinking in this way might contribute to social justice in higher education, but only if it embodies the very critical practice it preaches, and is careful to avoid predetermined and closed off subjectification outcomes where worldviews come ready made for transmission. Furthermore, identifying the lack of subjectification outcomes in natural science and environmental science courses within sustainability syllabi suggests that Dewey’s warning in his Democratic Faith is as true today as it was then. Education is still in need
of a vocational and technical education that is also enriched with what Dewey called “a genuinely liberal content.” and what today we might call education in morals, values, and skills in self-governance.\textsuperscript{111}

This chapter accomplishes little more than an introduction to the application of learning outcome frameworks to studies of sustainability education oriented around specific skills acquisition. Accordingly, applying Biesta’s framework to sustainability syllabi that include a systems thinking component suggest a number of possible paths for future research on the emergent skill set of critical systems thinking.

First, a great deal more work could be done to develop the theoretical categories initiated by Biesta, which have here been complicated as much as clarified through application to content analysis of syllabi. For example, work could be done to consider commonalities and distinctions of learning strategies for professionalization and civic behavior along the interface of socialization and subjectification. Socialization outcomes include explanations of social and professional contexts that are already established, such as learning about the state of the art or the agreed upon methodology, which a student might come to practice or contribute to. Socialization helps the student become situated in the state of play. How is socialization complicated when practice is considered disruptive of rather than a contribution to all that has come before? Is there such a thing as socialization for dissent? A theory of socialization into radical action

\textsuperscript{111} Self-governance is discussed in depth in chapter 5. It may be the case that there is an integration of outcomes at the program level; which is to say, the inclusion of courses that include subjectification alongside scientific courses that do not. Whether or not this is an appropriate degree of integration for students’ individuation and empowerment is not a question that can be answered given the limitations of the current research. However, the chapter on communication has more to say on integration at the program level, versus integration within course level experiences.
could have considerable insight into understanding education for the innovation economy, or for progressive citizenship.

Also, there are, as noted above, methodological difficulties that accompany the leap from syllabi text to actual classroom practices. This ambiguity challenges the already difficult task of categorizing learning outcomes along Biesta’s framework. A great deal more research could be done regarding how the categories can be distinguished and located in classroom practice, and how these categories can be confirmed through the use of alternative data sets and research methods, such as participant observation.

Also, this analysis revealed that the sustainability courses that include the most substantial subjectification outcomes have the least emphasis on exams. Assumedly this is the case because critical personal reflections do not well fit a standard exam model, and are more conducive to paper writing. But is critical systems thinking best assessed with research and personal reflection papers? Systems thinking educators suggest modelling as an assessment strategy. Another research agenda then, is to explore how critical systems thinking can be assessed through modelling; what these rubrics would look like, and how they might incorporate novel modelling techniques, like Gaventa’s power cube, to infuse the typical systems map with a critical component.¹¹²

Bachelor of Arts programs and liberal arts colleges were the most common location for sustainability studies courses that include a subjectification component. More research could be done on how the liberal arts and especially humanities courses might be adapted to include critical systems thinking and further improve this skill set

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with the reflective practice that humanities and liberal arts programs are known for. Furthermore, the liberal arts are currently under fire in many states, where top-down legislation to defund such programs and invest more in technical training are endangering the civic and liberal basis of education. Research can be done to tie the relevance of the liberal arts more directly to civic practice through longitudinal studies that would better substantiate the public value of the liberal arts and humanities. Ideally this could include measurement of traditional and emergent citizenship skills, such as critical systems thinking.

Along the same lines, more research could be done into how the natural sciences can include subjective dimensions without diminishing their value in methodological science instruction. This could also be framed as research into the potential for integrated program development, where courses without a subjectification dimension might be included alongside courses with strong subjectification, as a way to achieve a balance of learning outcomes technical, personal and civic. Assumedly, this would require intense program coordination and commitment to collaboration within the faculty. Identification of successful interdisciplinary and well-coordinated degree programs that span the sciences and the humanities would benefit such a research agenda. All of this is to suggest further research on viability and key strategies for institutional reform in support of sustainability education.

Lastly, emergence is a key systems concept for theorizing the means and ends of reflective practice in sustainability education, and emergence is key to connecting contemporary pedagogy and Dewey’s work on education that began over a century ago. Dewey’s democratic faith is also a faith that students given good opportunity and
good skills to capture the learning potential of each opportunity will develop successfully. Dewey doesn’t envision a strong predetermined end for these students, by which he might define success. Instead he conceives of learning as both means and end, and suggests that the student, achieving an ability and love for learning, will be prepared for articulating new and more relevant conceptions of the good, of how democracy can flourish, and of how science and technology can work in support of flourishing democracies. This is his democratic faith. In short, it identifies that learning is an emergent process, that outcomes cannot be too heavily predetermined, and that there is a degree of trust that educators take on, a trust that an adaptive pedagogical process grounded in self-reflective practice will best prepare students for the uncertain and unknowable future.

A pedagogy that embraces critical systems thinking and follows its emphasis on emergence, likewise prepares students for the unknown. This is Rousseau’s hope in *Emile*, where he brags of his student, “In vain will fate change his station, he will always be in his right place.” Just as the social and ecological situations that a student will face are emerging, so too can positive responses to these situations emerge. They cannot be predicted or planned based upon existing conceptions, though they must be informed by what we have thus far encountered and understood. “History,” writes Kurt Vonnegut, “is merely a list of surprises…It can only prepare us to be surprised yet again.” This same concept of the rapidly changing world and the need for new skills for adaptive learning surfaced in interviews with multiple sustainability educators. Here

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is included one such excerpt which explicitly ties the quickly changing world with the skills of systems thinking:

That’s the difference, generic skill building in order to do sustainability analysis is the companion that we need so much to go along with these other environmental or business or design or forestry etc. Students should be equipped to take on whichever. I show this video by Carl Frisch, “did you know”. It says a student entering a four-year program by the time they graduate fifty percent of what they learned their first two years is irrelevant, because of changing information. That tells me we really need to focus on the adaptation thinking skills, more than the domain based knowledge. That’s what analysis does that we haven’t done in the past. We tended to take a question and put it in a category of expertise to determine the right answer, instead of stepping back, asking who else do we need in this conversation, what’s going to happen if we take this step? That’s where we get into sustainable analysis, which crosses all these other disciplines.

Perspective expansion, mental models, appropriate duration, geographic areas, cultural issues is one that’s interesting and tricky but you obviously need that perspective but also what’s the future implication with the way things are going. By definition these are dynamic issues. We can’t expect them to ever stagnate. We have to build in the feedback in a way that we revisit the decisions; stronger models for double loop decision making as a perpetuation of decision making instead of thinking we get to an answer, we just take steps based on best available information, evaluate, and then a few years later do the process again just as a matter of routine. We introduce the concepts of systems and interrelations… I use the Meadows book, and it does a pretty good job of showing how to use modeling to get you there. Starting with basic relations in closed systems. We need to distinguish natural systems which are closed hard limited systems, from pretty much all human systems, with the exception of the human organism itself perhaps; but most of our open systems, arbitrary systems, subject to adjustment, subject to addition or depletion of resource, by virtue of decisions; and understanding how that effects the systems too, when there are open ended inputs and outputs. When we get to those models, at this point it’s less about the mathematics quantification piece and instead trying to discover leverage points in complex dynamic situations. Where is that piece that has a lot of inputs and outputs that may allow us to use an indicator approach to describe how we can influence it here and then cause a lot of other things to change, later on. It helps a lot just to see this.
The unknown is not only something to dread and prepare for, it is also a source of hope. Social systems are open systems, and this means there is great potential for change. But critical systems thinking alone does not prepare someone for action on what they know. The critical systems thinking skillset works to prepare students for negotiating complex ideas, but what more is needed to prepare students for action based on this understanding? The last agenda for further research that will be mentioned here concerns this matter of dispositions.

It has been argued that critical systems thinking should not predetermine a student’s worldview, but rather prepare students in the work of negotiating world views, and adapting paradigms. What are the emergent properties of the disposition of critical systems thinking? This research agenda could focus on student perspectives, and look for those emotional and dispositional traits that students identify as helpful and inspiring as they face the difficult social and scientific challenges associated with sustainability. To come full circle in this discussion of critical systems thinking, foundational system thinker Jay Forrester suggests that students of systems thinking must have courage. He writes, “A strong background in modeling should show students that conventionally accepted opinions about social and economic policies are often actually the causes of our most serious problems. If they realize that popular opinions are not necessarily correct, they should develop courage to think more deeply, look beyond the immediate situation, and stand against majority opinion that is ill founded and short sighted.” Courage here has a purpose in the furthering of scientific understanding, and as civic action in speaking the truth and speaking out against ill-founded arguments. According to Forrester courage functions not only to motivate one to stand up and speak a
different, deeper, or more precise truth. The critical systems gaze is directed at one’s own worldview as well:

Students should learn that all decisions are made on the basis of models. Most models are in our heads. Mental models are not true and accurate images of our surroundings, but are only sets of assumptions and observations gained from experience...The often-quoted line from the comic strips, “We have met the enemy, and he is us,” has more than a grain of truth. Usually, problems exhibited by a social system are caused by the people in that system. However, people naturally tend to blame others...In preparation for the 21st century, a systems education should condition students to look for the source of their troubles first in their own actions before blaming others.\(^{114}\)

Thus critical systems thinking includes students’ ability to understand and model interactions in complex scenarios, including information, uncertainty, and multiple perspectives including one’s own, all with a critical eye for appropriate precision and willingness to improve and adjust. However, in many classrooms today, and especially in contexts where tension is high, dialectic or dialogic inquiry is often avoided, for fear of raised tension and conflict.\(^{115}\) Research on the disposition of critical systems thinking might ask how the challenging of different worldviews can function in class settings where tension is high, or conversely, where tension appears to be so low that students become disinterested. Social systems are open. Thus there is potential for rapid change in social systems, and great leverage exists in acting directly upon worldview and cognitive-ethical paradigms. But there is also a danger of putting indoctrination before

\(^{114}\) Forrester, “Learning,” 18.

education in such efforts. Sensitivity to pedagogical style and consequence is key to
overcoming the challenges of working directly with worldview.

According to Forrester students should engage in such modeling not only
regarding the biggest of global problems, but with issues that students identify as
personally more relevant. Don't use systems models out of books, he warns - instead,
have students design their own, regarding whatever it is they care about. Critical
systems thinking can direct student attention to the immensity of the problems we face,
but it can also assist students in the identification of potential partnerships and networks
of support, and identification of all the assets in a community that can be mobilized in
positive change making.

The world is much changed since Socrates exchanged arguments in the Agora.
Can critical thinking continue to serve as a basis for citizenship? Director of the Norman
Lear Center, Marty Kaplan, in the last few years coined the term “Informed Citizen
Disorder” as a way of understanding some of the civic consequences of how the public
is currently inundated with information, but provided with few possibilities for action and
improvement. Kaplan summarizes his concept in an interview with Bill Moyers:

Ever since I was in junior high school, I was taught that to be a good
citizen meant you needed to know what was going on in your country and
in your world. You should read the paper, you should pay attention to the
news, that's part of your responsibility of being an American. And the
problem, especially in recent years, is the more informed I am, the more
despondent I am, because day after day, there is news which drives me
crazy and I want to see the public rise up in outrage and say, no, you can't
do that, banks. You can't do that, corporations. You can't do that polluters,
you have to stop and pay attention to the laws, or we're going to change
the laws. Every time that doesn't happen, and I keep learning each day
the same thing, something bad happened and nothing was done about it,
that's the news. The more that that's the case, the sadder one is when you
consume all that news. So all the incentives are perverse. The way to be
happy, to avoid this despondency is to be oblivious to it all, to live in Aldous Huxley's "Brave New World."\textsuperscript{116}

Much in response to the situation described by Kaplan, this chapter has worked to reconnect civics with a way of thinking that means a great deal more than the accumulation of knowledge. Critical systems thinking is a thinking framework for civic engagement and action, which can counter the tendency toward too much information and too little opportunity and ability for reflection, discussion, evaluation, and judgement. The shift in popular educational discourse toward higher order thinking skills is an opportunity to ask what it would look like to provide an education that more effectively gave students these skills. This chapter considered the cognitive skill basis for one alternative. A review of the literature suggests this alternative is uncommon, if not unheard of, in the mainstream civic education of political science. This same alternative, a timely form of critical thinking practice and civics education for complex times, is increasingly present in sustainability studies classrooms. Conceived as a foundational component of education for empowerment and the achievement of social justice, it is complemented by skills in collaboration and communication, to which the dissertation now turns.

CHAPTER 5
CONTINUITY, INTERACTION, AND AUTONOMY

Introduction
This chapter establishes theoretical coherence between the transdisciplinary pedagogy found in sustainability course design and described in the chapters that follow, and the contemporary environmental political theory literature. The chapter considers the political theoretical consequence of pedagogy that intends to cultivate skills and dispositions associated with pluralism and individuality - two key facets of liberal thinking. Invoking the experiential learning framework of John Dewey, it is argued that there is sufficient evidence to suggest transdisciplinary sustainability education would be an appropriate component of compulsory national or state level curricula for citizenship in societies that adhere to liberal values.

Why is Sustainability Education Transdisciplinary?
Sustainability can be understood as a pragmatic ideal, which is to say at least two things: one, it needs to be practiced, and two, its advocates pursue multiple goods in tandem and “ought to wear their willingness to compromise as a badge of honor.”¹ The nature of the complex problems associated with sustainability suggests a need for adaptive and cooperative approaches, involving a range of experts and stakeholders, each committed to problem-solving and solution-generating.² To apply this pragmatic ideal to education, sustainability educators often design transdisciplinary experiential

learning opportunities for their students. These experiences tend to focus on skills prac-
tice in communication and collaboration.³

The pragmatic ideal for sustainability, based on active practice, and willingness to com-
communicate and collaborate, is likely informed by the writings of John Dewey. Dewey
took the idea of active practice and developed a pedagogy for experiential learning, and
he considered communication the high art of humanity and a key achievement for
lasting democratic societies. Furthermore, as has already been considered, Dewey saw
the task of education for a new complex democracy to require the achievement of
integrating social liberal learning and technical and vocational learning. The
transdisciplinary learning paradigm takes this integration one layer deeper, recognizing
the potential for solutions that include non-academic expertise and community stake
holders alongside the technical, scientific, and liberal learning that is traditionally
associated with higher education. Lastly, transdisciplinary learning recognizes the
students themselves to be important stakeholders and producers of knowledge in a
range of scenarios. In summary, transdisciplinary practice occurs in schools by bringing
the local community into the classroom, by taking students out of the classroom and into
the local community, and, importantly, by supporting the development of a community of
students within the classroom.

Carlsson and Jensen (2006) call this the “school as political agent” model, where
local communities and students learn together through the inclusion of outside experts,
and where students play active roles in the community or larger society, informing the

³ Examples and statistics regarding transdisciplinary communication and collaboration practices in
sustainability courses are provided in the following two chapters
public, taking part in debates; choosing, framing, and working from problem to solution in collaboration with other impacted or committed individuals and institutions. As explained in the introductory chapter, a range of literatures were synthesized to develop the skillset of Transdisciplinary Communication and Collaboration, which guides the empirical research in the following chapters. The skillset for Transdisciplinary Communication and Collaboration includes:

- The ability to communicate effectively in diverse social situations
- The ability to cooperate and collaborate on shared tasks and engage in collective decision-making processes
- The ability to create and learn through interactive engagement with the world.

Transdisciplinary pedagogy engages communities of co-learners rather promoting the one-way transmission of information from the sage on the stage. Concerning sustainability education specifically, Arjen Wals (2009) writes, “When the space for participation and democratic involvement is wide, more interactive and transformative modes of education for sustainable development (ESD) are likely to emerge that tend to emphasize capacity-building and empowerment”. He is not suggesting there is no place for the transmission of “static” content, but he clearly stresses, “as the DESD progresses, so does the realization that ESD needs to move beyond the transmissive to a transformative mode.” He argues that this shift cultivates a more politically aware pedagogy, committed to the “democratic involvement of all

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4 Monica Carlsson and Bjarne Bruun Jensen, “Encouraging Environmental Citizenship,” in *Environmental Citizenship*, ed. Andrew Dobson and Derek Bell (Cambridge: MIT, 2005), 242. They argue that “collaboration with external partners in society can be seen as a significant contribution to the development of environmental citizenship. Among other things it supports pupils in a) developing knowledge about authentic environmental issues b) gaining experience with interaction and action c) developing engagement and motivation d) perceiving themselves as people who can influence their surroundings and e) developing a sense of membership and belonging.”
members of society,” corresponding with a shift in world political climate (democratization) and communications (internet based social-networking).⁵

Matters of sustainability and democratic governance, understood here in the context of education for citizenship, are often the stuff of wicked problems.⁶ Negotiating complex issues that involve disparate if not incommensurable world views will be fundamental to sustainable democratic societies, and will be largely achieved through heightened skills in collaboration.⁷ As much as sustainability educators may hope to prepare students for achieving consensus on important issues, they are also preparing students for an equitable and critical form of negotiation.⁸ Communication and collaboration skills, known collectively as interpersonal skills, are often practiced in courses that focus on team and group work learning outcomes. For example, one syllabus reads:

> interpersonal competence is important for sustainability problem-solving endeavors. Interpersonal competence is necessary for each of these steps, because each step involves complex subject matters, various experts who contribute their knowledge, skills and value systems, and socially contested decisions. Interpersonal competence helps us to develop our abilities to become great teammates, competent leaders and effective communicators⁹

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⁹ 68G
Wals argues that a primary distinction of sustainability courses occurs according to “the space allotted to concepts like participation, self-determination, and autonomous thinking.” He implies that this “open” form of education enables social transformation, rather than simply reproducing the existing society.\(^\text{10}\) In summary, sustainability education engages in transdisciplinary pedagogy by offering students more active roles in the development of course content, as change agents in local communities, and as citizens in training. Transdisciplinary communication and collaboration can include opportunities to interact with a range of local stakeholders and forms of expertise, to engage in simulated practice for decision making, to collect data in real time for globally organized experiments, and to participate in managing local ecosystem health.\(^\text{11}\)

**Transdisciplinary Learning – Civic Education in the Age of Liberal Individualism**

This section of the paper asks how transdisciplinary pedagogy might function to clarify sustainability’s civic task in liberal democratic terms. Political theorists have outlined the importance of communication and collaboration for sustainability.\(^\text{12}\) Less clear is the extensive body of work within the sub-field of environmental political thought that debates the compatibility of environmental citizenship with liberalism. Liberal democracies have mixed and sometimes appalling records when it comes to pro-environmental behaviors. It has been suggested that liberal democracy as a political framework might not have the regulatory power needed to enforce necessary

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\(^{10}\) Wals, *Mid-DESD*.

\(^{11}\) Chapters 6 and 7 detail examples from the sustainability degree programs.

environmental changes. Some argue for an aristocracy of scientific experts and policy makers in place of liberal democracy. Others have considered whether or not liberal democracy is too entwined with capitalism’s drive for economic growth. Still others have put forward an argument for a civic republican alternative or addendum to liberalism, for the benefit of environmental citizenship. At the heart of many of these debates exists a challenge to the ideology or social outlook or individualism.

As Bellah et al., pointed out two decades ago, “Individualism lies at the very core of American culture…There is a biblical individualism and a civic individualism as well as a utilitarian and an expressive individualism…We believe in the dignity, indeed the sacredness, of the individual.” What are the consequences of this individualism, if Dobson (2007) and others are right to suggest what we need now more than ever is


16 The common liberal conception, writes Honohan (2002), is based on the dimension of control: “In political terms, the public is identified as what is controlled by the state, and the private as what is not controlled by the state, and these are mutually exclusive…but for republicans the most salient dimension of the public is interest or relevance; what is quintessentially public is in the interest of all; what is private is in the interest of or relevance to one, a few or specified individuals, to sections of society. This does not map directly on to the state and non-state. Thus there is a less clear-cut opposition of private and public.” It is not a debate about state or no state, as common liberal and libertarian thinkers tend to engage in conflict with environmental values. The matter is the common good, the stability of the socially shared world, its environment and the resources we all make use of. Along with resource use, there is the importance of minimizing risk, exposure, and maximizing opportunities not included within the framework of resources or goods. Given these additional aspects, Honohan, following Arendt, suggests a civic vision inclusive of vulnerabilities and opportunities along with goods and resources, focusing on common interests rather than common goods (ibid.). Honohan’s work here helps show that a renewed sense of what is public is needed to understand the duties and obligations of citizenship. Iseult Honohan, Civic Republicanism, The Problems of Philosophy (London; New York: Routledge, 2002).

ecological or environmental citizenship? The historian James Kloppenberg (2001) has argued that a myopic vision of liberalism based upon individualism and private property, over the last half of the twentieth century, blinded historians and theorists to the possibility of democracy. He points out that Federalists and Anti-federalists were against anything like the atomistic individualism we now feel to be such a common characteristic of the liberal grain. Bellah has elsewhere forwarded a similar thesis, suggesting that what is missing from a classical liberal view of society is “the idea that in our life with other people we are engaged continuously through our words and actions in the creation and re-creation of the institutions that make our life possible.”18 Besides introducing the reader to a pedagogy of transdisciplinary experiential learning, this chapter deals with the political tension associated with the inclusion of advocacy within higher education course design, in order to establish a sense of both appropriate and inappropriate forms of experiential education and advocacy within higher education.

United States political culture and public sentiment is hesitant to embrace an educational program for active environmental citizenship, for fear of indoctrination and advocacy that endangers individualism. Democratic theorist Amy Gutmann argues that our society’s hesitation to recognize the value of cultivating virtuous citizens stems from a dichotomous understanding of the purpose of education. Gutmann describes an ideological divide, between educating so that students are free to choose among the widest variety of possible life courses (freedom of choice being the paramount good here), and educating so students choose the life that is best because a rightly ordered

soul is a paramount good (virtue being the paramount good here). She writes, “Give children liberty or give them virtue. This is a morally false choice.” Gutmann argues that education in the cultivation of intellect and character is unavoidable, and while there are obvious needs for constraints on advocacy in education, not all forms of character building are illegitimate.

For instance, there is clearly cause for hesitation when state and national level policy makers issue blanket changes to curricula which could endanger locally derived and historically developed conceptions of the good. Strong national-level prescriptions can be a warning sign of fascism, and liberal distrust can be an important reaction of citizens to strong-arm policies that could in the long run endanger their individual liberties. At the same time, it is important to remember that no education can claim total neutrality. The focus on technical solutions within the supposed neutrality of some interpretations of the liberal state carries over what Harry Boyte (1989) once called the technocratic strain of liberalism - “value free” techniques that in fact veil quite specific views of power and decision making. Despite arguments for the careful and explicit consideration of values education, such as those made by Gutmann or Boyte, there remains a tension between education reforms that would engender a more explicit and active conception of citizenship, and a political culture that is wary of “love of country” or “love of earth or nature” for that matter, as a form of indoctrination.

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Ibid., 43.
Education for moral development, character development, or ethical development, might all be seen as a form of “values education.” Education of this sort has the goal, in one form or another, to assist in the development of deep personal commitments, one’s sense of the good, or the purpose that would guide one’s choices in life. Common liberal sentiment would suggest that education in morals and ethics should be conducted in the private sphere of home or church, that public education in our society should not treat children as a means to a preconceived end, and that the choice of one’s end is the natural right of each person. On such grounds it has been suggested that even critical thinking is in fact an imposition on the private rights of citizenship.\(^{21}\) Peter Levine explains the more common civic educator model, which “is careful not to steer students toward any particular political views, but who tries to enhance their skills of deliberation, critical thinking, and participation.” This model exists, explains Levine, because liberal education would have students be free. However, emphasis on this protection of the individual has led to a notion of liberal education as neutral, since it shouldn’t predetermine a students’ ends.\(^{22}\)

There exist considerable theoretical resources for sustainability educators that would include a strong civic component and also up hold the values of a liberal democracy. For example, Derek Bell (2004) considered whether the promotion of an environmental ethic in schools was compatible with the political liberal’s commitment to ‘neutrality.’ He concludes that liberal neutrality is a chimera, writing, “A good ‘general’

\(^{21}\) For instance the Republican Party of Texas wrote this into their 2012 party platform. It can be found at https://www.washingtonpost.com/blogs/answer-sheet/post/texas-gop-rejects-critical-thinking-skills-really/2012/07/08/gJQAHNpFXW_blog.html. *The party later retracted the statement, after considerable bad press.

\(^{22}\) Levine, Future, 143.
education cannot be a neutral education. It can only be one among many conceptions of ‘education for living.’” William Galston (1991) issued a similar challenge when he proposed that other theorists had mistakenly “presupposed a two-value model: Either a society is neutral, or it must be restrictively partisan, even covertly perfectionist. This is much too simple. The good is a continuum, not a dichotomous choice.” These theorists are not attacking liberalism. They are purging it of an overly simplistic notion of neutrality. For the last 20 years, Marcel Wissenburg has contributed scholarship to the liberal-environmentalism debate. He too argues that liberalism does not have a neutral standing. Perhaps more importantly, Wissenburg admits that after producing a large but fairly misguided body of scholarship on environment and liberalism, he finally realized why that scholarship was ultimately unsatisfactory. It turns out, there are many liberalisms and many environmentalisms, and in a vast range of combinations of these isms, one can find considerable ground for productive synthesis, or at least compatibility.

Charges of advocacy occur when students’ existing value systems are challenged and when students are asked to participate in activities that involve socially charged or contested issues, such as attending public hearings over disputed land use


27 Ibid., 135.
issues, or pamphleting for a specific cause. And yet, a pluralist society requires persistent debate and renewal of perspectives, and communicative competence is a precondition of participation in a democratic society.28 Researchers are beginning to link participation skills that develop shared decision-making capacity with the achievement of social justice.29 Studies have shown that students who engage in community-based learning experiences, such as service learning, showed an increased long term commitment to civic action, and also higher satisfaction with learning in general.30 Experiments by educational psychologists at the University of Amsterdam found that dialogic experiences in citizenship education do far more to advance students own personal opinions on important moral issues than standard approaches to material, and that group work is the best way to incorporate dialogic learning.31

Transdisciplinary collaboration is not well suited to a political framework of individualism that stresses competition, but this does not mean that the individual is not the subject of transdisciplinary collaboration, or that transdisciplinary education is any less committed to the cultivation of empowering skills and dispositions for each individual. Just as sustainability educators promote increasing the diversity of ecosystems, many work to increase the diversity of student interactions, and the


29 Gaventa and Barrett, So What


diversity of possibilities for creative solutions and new connections for novel collaboration. Collaboration well achieved is a vibrant expression of individuality for everyone involved. Sustainability Education, especially in its efforts to promote collaboration and communication, can be an education in self-governance. To understand this confluence of liberalism and sustainability, it is necessary to understand some of the history of policy and decision-making in environmental and sustainability issues.

**Transdisciplinary Learning and Self Governance for Sustainability**

Environmental governance begins in many ways with the development of the United States Environmental Protection Agency, and federal regulation of industrial level environmental abuses. Governance is today characterized by a decreased focus on state institutions and an increased focus on the relational processes that tie the state to civil society. This emphasis further constitutes and is constituted by the expansion

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32 Between 1970 and 1979 the budgets of regulatory agencies grew by 530%, and employment in these agencies grew by 216%/Cass R. Sunstein, *After the Rights Revolution: Reconceiving the Regulatory State* (Harvard University Press, 1993), 30. Since the 1970s, it is reported that the US has spent more than $4 trillion on protecting the environment against pollutants, mostly through the administration of federal regulations (Daniel J. Fiorino, *The New Environmental Regulation* (Cambridge, Mass: The MIT Press, 2006), 2). The development of federal level environmental regulation followed the recognition that pollution occurred across state boundaries. Moreover, it was assumed that the states might not be willing to enforce regulation, since this can lead to economic failure as industries moved to less strict states (Ibid., 6; Bruce A. Williams and Albert R. Matheny, *Democracy, Dialogue, and Environmental Disputes: The Contested Languages of Social Regulation* (Yale University Press, 1998), 75). Regulation in this early period included the passage of the Clean Air Act and the formation of the EPA in 1970, followed by the Federal Water Pollution Control Act in 1972, the Safe Drinking Water Act in 1974, and the Toxic Substances Control Act and Resource Conservation and Recovery Act of 1976 (Fiorino New, 44). This all began in a period of economic prosperity, and it wasn’t until the recession of the mid 1970s that industries had cause for their complaints that this regulation would severely hinder the nation’s economic prosperity. During this period, environmentalists used the federal government as leverage against the states, which were perceived as blindly devoted to pursuing economic prosperity Louis Galambos, ed., *The New American State: Bureaucracies and Policies since World War II*, 1St Edition (The Johns Hopkins University Press, 1987), 45.

33 My initial description of governance in this section of the paper is indebted to Mark Bevir, *Democratic Governance* (Princeton, N.J: Princeton University Press, 2010).
of public discussion and action to include new social actors, and in turn, the rise of new forms of knowledge and expertise; in short, transdisciplinarity. This includes strategies for public management through marketization on the one hand, and public management through local not-for-profit associations and community organizations on the other. Both approaches engage with the central concern of liberalism broadly conceived, which is to be understood not as any specific ratio of public and private power, but as the constant search for the appropriate balance between the two, given a specific problem.

The version of governance concerned with increased participation, improving democracy, and the inclusion of new forms of knowledge means to avoid collective action problems and develop social mobility and social mobilization. Whether one is more inclined to this commitment to democracy or the potential of the market to

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34 The contemporary version of governance concerned with marketization is situated within two varieties of liberal politics. The German ordo-liberal version is concerned with the state’s legitimate role in maintaining a political environment conducive to market competition, not just market exchange. This approach suggests a greater role for the state than the neo-liberal version that stresses a minimalist state, and overall free exchange among markets. Together, the ordo- and neo-liberal strains represent one approach to governance, based on development of global market interactions especially in parts of the world that are beginning modernization processes.

35 Edward N. Megay, “Anti-Pluralist Liberalism: The German Neoliberals,” Political Science Quarterly 85, no. 3 (September 1, 1970): 422–42; The participatory governance approach regards the extent and potential for collective self-government in particular scenarios, while the market liberal end is more concerned with opening up potential markets and increasing quality of life by way of increasing GDP. This distinction is further refined by studying the variance in differing definitions of civil society. Governance for market expansion and infiltration sees civil society as including and being composed largely of markets, and the concern of these markets. Governance for social inclusion describes civil society as distinct from state and market forces, and often in opposition to markets. These lines are firm only in the literature and clearly political in their conception. For example, “the World Bank promotes an efficient liberal economy based on free market through both a liberal state enforcing property rights and contractual obligations, and a liberal civil society sustaining and restraining such a state.” (Bevir, 2010)

empower a greater range of stakeholders, the goal of education in a liberal society is education for self-rule.

Self-rule does not occur in a theoretical vacuum of individualism. Self-rule occurs through interaction with markets, with civil society, with other human beings, and with environments. Thus, it is largely through education that cultivates individuals capable of engaging successfully in these types of interactions that self-governance might successfully function as a form of 21st century citizenship. Its effectiveness is directly linked to people’s willingness to participate, and capacity to participate successfully; hence the argument for practice in self-governance within sustainability classrooms, often through the pedagogical lens of experiential transdisciplinary learning for communication and collaboration.

The meaning of self-governance, or self-rule, is captured in the term autonomy, following the Greek - autos (self) and nomos (rule or law). It can be understood as the quintessential modern project, going back to the changing relationship between an individual’s developing capacities and the vagaries of power. The crux of the issue is the realization that freedoms are developed, not natural.

Past theorists have argued that a focus on individual autonomy is a cause of environmental problems. William Ophuls issued such a challenge to liberal democracy in his (1977) *Ecology and the Politics of Scarcity*. Ophuls wagered that the end of colonization and the completion of industrialization would lead to the inevitable return of scarcity. Scarcity, he argued, did not create conditions conducive to democratic self-rule, and conflict would ensue unless a strong state could rule over and manage human-environment interactions for the long term. Similarly, Robert Heilbroner wrote,
“There will be no escape from the necessity of a centralized administration for our industrial world.”

The guiding notion for both thinkers is that those people who understand the needed changes, scientists primarily, should be put in the position to prompt and engender this change in the general behaviors of the population.

David Orr and Stuart Hill argued that strong centralist thinkers, like Ophuls, made a number of important assumptions: 1) that an authoritarian state can cope with its own increased size and complexity; 2) that it can muster sufficient skill to exert control over the external environment; 3) that these conditions can be maintained in perpetuity; and 4) that we have no practical alternative to the authoritarian state. Orr and Hill then went on to explain that the decentralist response to environmental issues, coming from writers such as Schumacher and Lovins, had its own assumptions as well: 1) centralization is itself one of the principle causes of the problem, in the form primarily, of the large, unaccountable modern corporation; 2) that centralization has resulted in the loss of a sense of appropriate scale of behaviors and meaningful purpose; and 3) smaller scale units can practically encourage the participation of communities of citizens in ways that can effectively manage environmental crisis. Orr and Hill conclude by suggesting that the either-or approach of these two groups was an unnecessary division. They write, “decentralization whether applied to population, the economy, technology, or political power, ironically, will depend upon the assistance and active involvement of government.”

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37 Heilbroner, *Inquiry*, 160

38 Ibid., 189

39 David W. Orr and Stuart Hill, “Leviathan, the Open Society, and the Crisis of Ecology,” *The Western Political Quarterly* 31, no. 4 (December 1978): 467. As an aside, it is remarkable that as far back as 1978, Orr and Hill were able to see much regarding the actual course of US environmental politics, and had at
across scales of influence and decision making, and through the incorporation of additional perspectives. In short, the capacity of individuals to collaborate and work at multiple organizational scales would define political responses to environmental challenges. Orr and Hill’s insight helps chart a way forward for an individually empowering form of civic education based on a specific conception of autonomy.

For most, autonomy is intimately bound up in an experience of relative freedom. Phillip Pettit has worked to articulate a contemporary theory of republicanism based largely on the patently republican notion of freedom as non-domination. Non-domination means citizens do not live under the potential harmful power of another, or the “evil of subjection to another’s will.” Freedom as non-domination, when taken along with the view of citizens as repositories of the public good, means that it is not enough to have a regulatory system in place that would stop such activities. What is required is a public informed and capable of recognizing these potential dominations, and with enough agency to collectively organize and deliberate regarding what to do about it.

that point already explicitly set their sights on “resilience”. In like fashion, they set the stage for what would become the goal of sustainability - “the ecological crisis is as much a challenge to our social and political creativity as anything else. There are two tragedies to be avoided. One is the very real possibility that we will wantonly destroy our life support system. The other is the almost equally grim prospect that we will jettison the open society and much or our western heritage in the name of survival. Our argument is that neither of these outcomes is necessary.”


41 Pettit’s work in this area does have important consequences for the subject of this dissertation. Freedom as non-domination is a fundamental precondition of sustainable societies, and its absence is played heavily in the development context, where seemingly well-intentioned efforts to develop via certain market mechanisms has undermined the very social and environmental situations meant to be improved upon. The subtle plays of power often go unchecked where the requirements of procedural democracy are fulfilled. Critical acumen and the ability to see the deep connections and power workings in a given scenario are how this sort of injustice is avoided. The potential harmful power of another plays out in current events frequently, with the most recent being the factory explosion in China. Industrial malpractice led to the harmful domination of a great many people, and will continue to do so as these consequences unfold.
Freedom is also conceived as the development and exercise of freedom; and it is here that republican thought intersects with various approaches to sustainability education, including skills-based education, capabilities education, competencies education, and transformative education. In the 1990’s, during the heyday of communitarian challenges to liberal individualism, Dagger identified six (overlapping) types of civic virtue, as being most directly civic and most vital to what he called republican liberalism.42

Dagger conceived of the basis of autonomy in public education as beginning with “basic skills, [which] then goes on to offer more options and individual choice in secondary school, then offers even more options in colleges and universities.” These skills enable us to function in the world, and without them, he writes, we are “almost certain to remain too dependent on others to have a chance of becoming autonomous.” The skills “provide a basis from which students can go on to appreciate what options are open to them and what their choices entail.”43 He links these same skills with the achievement of civic virtue, as “those who lack these skills are likely to remain dependent on others for information and political guidance as well as for livelihood and other forms of association.”44 To summarize, the virtuous one is the one who governs

42 They are 1: individual rights - individuals do have rights, and these rights relate and connect people as much as they separate people. Respecting these rights includes 2: valuing autonomy - “the virtuous citizen will want to protect and promote the ability to lead a self-governed life”. This leads to 3: toleration of different opinions and beliefs; which is connected to the notion 4: that all are deserving of fair play. In this notion, and the realization that we are taking part in an ongoing, changing community of people, 5: we cherish civic memory. Lastly, in order to uphold and practice these virtues, 6: one must take an active part in this politics - one must see the importance in participating in associations and organizations, which protect, uphold, and offer a space for the practice of our autonomy. Philip Pettit, Republicanism: A Theory of Freedom and Government (Oxford; New York: Oxford University Press, 1999), 196-198;

43 p.121

44 ibid.
well, which means, in our society, the virtuous one is the one empowered to protect, promote, and practice autonomy.

Dagger defined autonomy as “the ability or capacity to govern oneself - an ability or capacity that someone who is free (from external restrictions) to govern himself or herself may not always enjoy. This is why we say that insane people are not autonomous, for it is not the right to rule their lives that lack but the capacity to do so.”

According to Dagger, people are entitled to practice and exercise autonomy. But people do not develop or maintain their autonomy entirely on their own. They all rely on the assistance of others. What remains crucial is not “merely the right to be left alone,” but also the right to the protection and promotion of one’s ability to lead a self-governed life.

Importantly, as Dagger specifies, “To conceive of autonomy as total independence or self-sufficiency is to misconceive it. Autonomy is self-rule, but it is rule that aims at the realization, not the constriction or destruction, of the self. In this respect it is “…an ability or capacity that needs to be cultivated - the ability or capacity to lead a self-governed life.” And as he points out numerous times in Civic Virtues, one’s autonomy is bound up in interdependence with other citizens’ potential autonomy as well.

Dagger goes to some length to describe the various types of civic virtues, but he has much less to say about how virtue would be inculcated in the classroom. What makes education for civic virtue palatable to a liberal society is its basis in

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45 p.30

46 The key point of synthesis in Dagger’s liberal education for civic virtue is his relational conceptualization of autonomy. As defined by feminist scholar Catorina MacKenzie (2008), “a relational approach to autonomy grounds an agent’s normative authority over decision of import to her life in her practical identity and in relations of intersubjective recognition.” Catriona Mackenzie, “Relational Autonomy, Normative Authority and Perfectionism,” Journal of Social Philosophy 39, no. 4 (December 1, 2008): 520
transdisciplinary pedagogy that provides opportunities for personal interaction and
development of one’s own worldview. Sustainability courses that engage in experiential
learning benefit from the pedagogical insight that classroom practice and especially
social and personal reflection activities are key opportunities for each individual student
to develop his or her autonomy. But sustainability educators needn’t delve into
contemporary debates regarding liberalism and environmentalism to inform this
practice. The key pedagogical components are evident in John Dewey’s concepts of
interaction and continuity.

**Interaction, Continuity, and the Democratic Faith**

John Dewey accomplished one of the classic syntheses of individual and
collective ends in his response to Walter Lippmann, *The Public and Its Problems*
(1927). Two years prior to this publication he wrote, “The Individual which American
thought idealizes is not an individual per se, an individual fixed in isolation and set up for
himself, but an individual who evolves and develops in a natural and human
environment, an individual who can be educated.”47 It appears as if Dewey foresaw
trends in environmental management, urban planning, international development, and
citizen science, where greater inclusion of local stakeholders in data collection, framing,
and knowledge production would challenge the collaboration and communication skills
of experts and non-experts alike. Science would come to inform the social realm, as it
had the technical realm, for the development of “free social inquiry…indissolubly

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47 John Dewey reprinted in Hickman and Alexander, *Volume 1*, 12.
wedded to the art of full and moving communication.” Dewey saw the response to increased complexity rooted in educational improvements in communication.

James Kloppenberg points out that Louis Hartz’s liberal thesis of individualism came to prominence, “just as John Dewey’s ideas went into eclipse.” In a hopeful tone, Kloppenberg suggests that, “Perhaps the recent renaissance of American pragmatism will help to refocus attention on the potential harmonies that Dewey envisioned between our culture’s commitments to open-ended scientific inquiry and his ideal of an open-ended, experimental, pluralist democracy.” The timeliness of Dewey’s revival is considerable. Dewey emphasized that science and technology must be put in service of the public good, while also emphasizing that we cannot blame science and technology for the present state of affairs. The task, referred to throughout the dissertation, “is to fill education having an occupational direction with a genuinely liberal content.”

Reviewing Dewey’s experiential learning framework through his polestars of continuity and interaction, enables a broadened conception of environment and an iterative pedagogical strategy of interaction and reflection. Furthermore, this pedagogy contains an important argument for the renewed importance of the liberal arts in an emergent conception of ecological citizenship.

48 Ibid., 307.


51 Dewey’s work re-envisioning the public and promoting an active democratic citizenry has been linked with liberalism and civic republicanism. F.C. Da Silva (2009) writes, “It is precisely from the conjugation of these two elements, civic participation and social pluralism, that Dewey reconstructs the republican tradition he inherited from Jefferson and through it he expresses a powerful criticism of “old liberalism” (p364) With a career that spans over 65 years, and in response to a rapidly changing America, Dewey’s extensive body of work can be applied and aligned to a great many philosophical and political positions. The fact remains that Dewey self-identified as a democratic socialist, and the one thing that carries over
Dewey explicitly links freedom to a quality of experience that is liberating, which is to say, the experience should open up possibilities and future opportunities, rather than closing them off. The only freedom of enduring importance, writes Dewey, “is freedom of intelligence, that is to say, freedom of observation and of judgment exercised in behalf of purposes that are intrinsically worthwhile…of power to carry deliberately chosen ends into execution…For freedom from restriction, the negative side, is achieved as a means to a freedom which is power: power to frame purposes, to judge wisely, to evaluate desires by the consequences which will result from acting upon them; power to select and order means to carry chosen ends into operation.”

Dewey specifies that negative freedom, which he calls freedom from restriction, is important, but it is important as a means toward the attainment of a still more crucial form of freedom, which is the positive freedom of power. What today might be called empowerment was the basis of experiential learning for Dewey.

This first aspect of Dewey’s democratic pedagogy conceives the successful learner as an increasingly capable learner. Just as Lovins and Lovins (1982) define resilience not only as the ability to withstand shock, but the ability to react to shock in such a way that the system in question becomes still more resilient, strengthening from stress like a muscle, so Dewey sees the development of communication as the

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53 “Growth in judgment and understanding is essentially growth in ability to form purposes and to select and arrange means for their realization.” Ibid.
cultivation of the ability to perceive a situation and derive from the experience a still
greater ability to communicate, interact, and learn from situations.

Dewey distinguished his project of democratic faith, from the “old faith.”\(^\text{54}\) He
found fault in the insistence upon a false view of science and technology as neutral,
natural forces, where in fact, “science and technology are transactions in which man
and nature work together and in which the human factor is that directly open to
modification and direction.”\(^\text{55}\) Dewey also recognized that we make the same initial fault
if we blame science and technology for the present state of affairs.

Dewey’s approach to learning, its cyclical character, was popularized in David
Kolb’s (1984) experiential learning cycle. Kolb defined Dewey’s learning cycle as “a
dialectic process integrating experience and concepts, observations, and actions. The
impulse of experience gives ideas their moving force, and ideas give direction to
impulse.”\(^\text{56}\) In 2010, in a well-cited article, Reijo Miettinen charges Kolb with
misrepresenting Dewey’s approach, and erroneously relating it with Lewin’s experiential
learning model. Mittenen works to ground Dewey’s notion of experiential learning in
Dewey’s inclusion of culture and reflection. Mittenen cites a short passage from

\(^\text{54}\) Dewey, *Democratic Faith*, 274 “It was held that the revolution which was taking place in commerce and
communication would break down the barriers which had kept the peoples of the earth alien and hostile
and would create a state of interdependence which in time would insure lasting peace…and the belief
that a general development of enlightenment and rationality was bound to follow the increase in
knowledge and the diffusion which result from the revolution in science that was taking place…and this
would produce] a gradual but assured withering away of the powers of the political state….and that the]
vast, almost incalculable, increase in productivity resulting from the industrial revolution was bound to
raise the general standard of living to a point where extreme poverty would be practically
eliminated…these generous expectations have been disappointed.”

\(^\text{55}\) Ibid., 276.

\(^\text{56}\) David A. Kolb, *Experiential Learning: Experience as the Source of Learning and Development*
(Prentice-Hall, 1984), 22.
Dewey’s *How We Think* to illustrate Dewey’s critical appraisal of culture and the importance of reflection. But it was elsewhere that Dewey more fully explained the role of culture and reflection. He wrote, “With the animal it was simply the happy guess, - the chance…with man it is the intelligent and controlled foresight, the necessity of maintaining the institutions which have come down to us, while we make over these institutions so that they serve our changing conditions. To give up the institutions is chaos and anarchy; to maintain the institutions unchanged is death and fossilization.”

Dewey stressed culture because the goal, much like the goal for sustainability, is a healthy negotiation between tradition and innovation.

Education for citizenship today requires the cultivation of students’ ability to reflect personally and in groups upon what is important and should be conserved, and what is needed and must be changed, invented, or disrupted. To the extent personal values or behaviors are challenged or substantiated in sustainability education, it can be understood as education and not indoctrination based on its alignment with transdisciplinary pedagogy that supports each student’s developing autonomy through the recognition of shared responsibility and interdependence. As Dewey explained, this process of empowerment occurs through experiential learning in collaborative problem solving and communication.

57 “The term experience may thus be interpreted with reference either to the empirical or to the experimental attitude of mind. Experience is not a rigid and closed thing; it is vital, and hence growing. When dominated by the past, by custom and routine, it is often opposed to the reasonable, the thoughtful. But experience also includes the reflection that sets us free from the limiting influence of sense, appetite, and tradition.” Dewey, *How We Think*, in John Dewey, *The Later Works of John Dewey*, Volume 8, 1925 - 1953: 1933, *Essays and How We Think, Revised Edition*, ed. Jo Ann Boydston, Revised edition (Carbondale: Southern Illinois University Press, 2008).

According to Dewey, the quality of an experience has both an immediate aspect of agreeableness or disagreeableness, and also the aspect of its influence upon later experiences. “Hence,” he writes, “the central problem of an education based upon experience is to select the kind of present experiences that live fruitfully and creatively in subsequent experiences.”\textsuperscript{59} The principle of continuity “rests upon the fact of habit, when habit is interpreted biologically. The basic characteristic of habit is that every experience enacted and undergone modifies the one who acts and undergoes.”\textsuperscript{60} This is a conception of habit as more than a repeated or patterned way of doing things or making choices. This is habit as a process of formation of “attitudes that are emotional and intellectual.”\textsuperscript{61} Dewey admits that there is a level of continuity in all experiences, but this does not make all experiences educational. “The principle of continuity is evaluative of experience when it recognizes whether the learner is growing in a direction that is conducive to further growth, or in a way which limits the learner’s “later capacity for growth.”\textsuperscript{62} This is the first Deweyan principle for interpreting experiences in their educational capacity.

The second, the principle of interaction, distinguishes experiential education from education of a more traditional variety in terms of an orientation to environments, broadly conceived. In traditional education, “The school environment of desks, blackboards, a small school yard, was supposed to suffice. There was no demand that

\textsuperscript{59} Dewey, \textit{Experience and Education}, 9.

\textsuperscript{60} Ibid., 12.

\textsuperscript{61} Ibid., 13

\textsuperscript{62} Ibid., 14.
the teacher should become intimately acquainted with the conditions of the local community, physical, historical, economic, occupational etc., in order to utilize them as educational resources. A system of education based upon the necessary connection of education with experience must, on the contrary, if faithful to its principle, take these things constantly into account.\textsuperscript{63} The principle of interaction explains Dewey’s emphasis on communication. Communication is not merely the transmission of information. Communication is an encompassing process, referring to the way humans interact with environment, broadly conceived.

Thomas Alexander (2002) has written on this understanding of Dewey’s prescient work, which “replaces the Greek ideal-knower with that of a creative ecosystem in which change, plurality, possibility, and mutual interdependence replace the canonical concepts of substance, timelessness, logical identity, self-sufficiency, and completion. Such a position might be called ‘ecological emergentism.’”\textsuperscript{64} The practical implications of an ecological approach to learning looks much like Dewey’s description of how interaction functions to guide the quality (which is to say the learning potential) of an experience, especially through communication.

Furthermore, Dewey stressed the need for progressive improvement of learning ability, what some now call life-long learning, or adaptive learning. It is the contribution to the long trajectory of quality of interactions that designates the educational quality of an experience. “As an individual passes from one situation to another, his world, his

\textsuperscript{63} Ibid., 15.

environment, expands or contracts…What he has learned in the way of knowledge and skill in one situation becomes an instrument of understanding and dealing effectively with the situations which follow…Continuity and interaction in their active union with each other provide the measure of the educative significance and value of an experience.”

All learning, thus, is based in experiences, and the educational potential of experiences is based upon the principles of continuity and interaction. The first principle exhibits a sensitivity to time. The second principle a sensitivity to space. Both principles are based in collaboration and communication skills, which are seen as tools for living in a dynamic and changing world.

For Dewey, education, by definition, “adds to the meaning of experience” and adds to “the ability to extract meaning from future experience.” This process is completed only if students engage in the search for significance in events. Significance is identified as students assign value to some things over others. This is done in social interactions and in personal reflection. What happens when reflective learning time is taken away? If students are not given guided experience and practice in finding and articulating the significance of their learning experiences, they may fail to continue in the development and maintenance of their own moral perspective, which is a failure for autonomy. Helping students to recognize the continuity of their learning processes, and their many levels of interaction with environments, allowing students time and guidance in reflecting on the meaning of these experiences, imbues technical and scientific learning with what Dewey called “liberal content”. The democratic faith suggests that

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students’ value system will come to reflect and uphold the freedom of inquiry and open communication that instigated the learning process. These are key goals of sustainability education and contemporary citizenship education, which mean to improve the quality of human interactions with other humans and with the environment.

Some sustainability educators interviewed for this dissertation found there just wasn’t enough time to do it all, some worried over how such reflections might connect the massive global issues of sustainability with the seemingly insignificant impact of individual students. One educator found that the role of reflection and the liberal arts was being delegitimized from within his/her own interdisciplinary department. An excerpt from this interview well illustrates the point:

I hear students in our department say things like, “I'm so glad this program focuses on hands on learning and not just reading books.” Which for me is kind of devastating, because I don't separate the thinking person from the active person. When I am talking about sustainability it is a way of thinking as well as a practice. It's a way of training your mind to see the world in a particular way. It comes from humanism, it comes from an exploration of existential questions: who am I and where am I? Asking what is the meaning of life, what is my significance on the planet. For me these kinds of questions come out of the environmental humanities. It’s key to be able to train young minds to think about our moral responsibility to each other. And that’s something I really struggle with as an educator in a sustainability program, because I constantly have to confront the disdain from my colleagues who are in the natural sciences, concerning the worth of my field, and also it gets perpetuated by the students, who pick that up. Students in an academic setting believe that an academic program is not as valuable as a hands on training program, and that to me is one of the

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68 The gender/sex of the interviewee is withheld to aid in protecting that person’s identity.
greatest disservices that we are currently doing to our students in sustainability.

Some of us are trying to upset that very mindset, that separates nature from culture, that separates science from mind that separates feeling from doing. We can’t reinforce the very dichotomy that we are trying to upset. That is one of the primary challenges for people working in the environmental humanities; to build bridges with colleagues in the natural sciences. People might say, “oh yeah the humanities should be a part of it, but it should just be this little part, it should just be this one class.” I just feel like when you are at a liberal arts university it is your responsibility to be teaching to that end. Rachel Carson was a scientist, but it was her literature that ushered in the greatest environmental legislation that our country has ever seen. It was her writing about the science that enabled the general public to understand. Thinking critically about important questions like what is life’s meaning, is not so separate from planting seeds and economic development. To separate them is really dangerous.

The development of experiential transdisciplinary pedagogy within sustainability courses is providing important skills practice in communication and collaboration, as the next two chapters will show. At the same time, there is a danger that the emphasis on real world practice will devolve into a form of vocational training that lacks adequate time for personal reflection and meaningful conversation with classmates. As students increasingly seek out more internships and fieldwork opportunities in organic agriculture, plant identification, start-up entrepreneurial work, and otherwise, the lesson from Dewey is that it will be all the more important to keep what is best of the traditional liberal arts classroom.

**Conclusion**

It is true, some forms of environmentalism mean very consciously to inculcate a deep love of “nature” as environment, so that people will be willing to protect it. Such is no different than attempts in the tradition of republican writings to inculcate love of country and willingness to die for one’s country. As citizens of a liberal republic, many are increasingly wary of such strong indoctrinating programs. Sustainability educators
need not rely on the cultivation of the love of nature to achieve their goals. Personal skills development for communication and collaboration can promote an enlightened and benign form of self-interest without denying the social character of learning and the importance of collaborative decision-making and problem solving. Sustainability educators can accommodate the importance of the individual in liberal societies without denying the interdependence that exists beyond individual hopes and desires.

Citizenship education as conceived herein includes the development of personal values and the ability to recognize and interpret value systems, in self and others; but it is not a top-down pedagogy that would impose a single value system, as some versions of environmentalism might.

Sustainability education includes an education in the responsibilities of freedom, not freedom from responsibilities. It can do so on liberal grounds, by maintaining a practice of values education and moral development that is linked to autonomy, and practiced through experiential learning that constructively affords and guides the development of skills in communication and collaboration. The following two chapters review evidence of transdisciplinary communication and collaboration practice in sustainability degree programs.
CHAPTER 6
TRANSDISCIPLINARY COMMUNICATION PRACTICE

“Science is not achieved by distancing oneself from the world; as generations of scientists know, the greatest conceptual and methodological challenge comes from engagement with the world.”

Introduction

This chapter reviews communication skill development and especially transdisciplinary communication skill development within sustainability studies degree programs. Communication can be understood as a primary activity that supports or hinders successful collaboration. Communication is both verbal and nonverbal. It is “the ‘stuff’ that imitates, builds, maintains, and destroys relationships.” Communication skills refer to a range of interpersonal skills beyond basic speech and writing. In support of collaborative team processes, communication requires learning “risk taking, helpful criticism, objectivity, active listening, giving the benefit of the doubt, support, and recognizing the interests and achievements of others.” Communication is a key variable in the achievement of fair and open deliberation.

This inclusive approach to decision making and negotiation with disagreement is at the root of transdisciplinary pedagogy and knowledge politics. Julie Thompson Klein

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(2001) is credited with defining transdisciplinarity in the context of research as “different academic disciplines working jointly with practitioners to solve a real-world problem.” She traces the development of the term “transdisciplinary” to the Organization for Economic Cooperation and Development (OECD) international conference on interdisciplinarity in 1970. Erich Jantsch (1972) did much to develop the term and emphasize its purposive orientation “to foster self-renewal and judgement in complex and dynamically challenging situations.” Referencing a transdisciplinary program at the University of Basel, Klein confirms transdisciplinary education’s focus on competencies in communication, team-development and project management. Most recently, developments in transdisciplinarity have evolved alongside “European and North-South partnerships for sustainability.” There is, thus, a meeting of environmental interests, communication skills development, and transdisciplinary epistemology and pedagogy that helps to define a unique approach to civic education in sustainability studies. The following analysis of the data confirms Klein’s emphasis on the scientific value of transdisciplinary practices, but also reveals a lack of transdisciplinary communication practice in science specific courses, suggesting that there is something like the integration of scientific and liberal content described by Dewey as the task of education, but only at the program level. Challenges to such an integration at the course

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7 Julie Thompson Klein, “Education” in Handbook of Transdisciplinary Research, ed. Gertrude Hirsch Hadorn et al., 2008 edition (Base; Boston: Springer, 2009), 399.

8 Ibid., 403.

9 Ibid., 401
level are considered. The chapter employs Freire’s banking model critique of education to distinguish transdisciplinary communications practice from communication opportunities that reinforce communication as the one-way transmission or dissemination of information from experts to the public.

**Transdisciplinary Communication and Freire’s Banking Model Critique**

Students in sustainability courses claim to want more communication practice, but also express hesitation when it comes to engaging in the type of group work that would give them more group practice. Consider these excerpts from student blogs:

I feel that our class lectures could incorporate more class discussion. It is both entertaining and interesting to hear what my peers think, feel, and have experienced.

What I would like add to the class would probably be spending more time where we discuss current news related to the topics being discussed in class. This way we can listen to other students’ views and concerns. I try to be very informed, and I have a lot of interest in learning how others react to these issues.

The most recent class shattered any of my doubt and gave me mountains of hope: we sat outside and deliberated. Split into small groups it was much easier to hear everyone’s opinions and it was finally clear that everyone was truly excited about sustainability. It was as if downsizing the relative community and allowing them to discuss within their natural element (outside) brought out the fire that should always exist in sustainability students.

Communication is often impaired in the classroom as a result of the traditional sage on the stage lecturing model. Paolo Freire issued the most well-known critique of this approach to education in the second chapter of his famous work, *Pedagogy of the*
Oppressed (1970). Therein he described how, “Education thus becomes an act of depositing in which the students are the depositories and the teacher is the depositor. Instead of communicating, the teacher issues communiques and makes deposits which the students patiently receive, memorize, and repeat. This is the ‘banking’ concept of education.”

Rather than passively receiving information, rather than merely practicing a speech, or struggling to win a debate, students want the opportunity to interact with each other, and to take their own and each other’s ideas seriously. They want a structured space in which to engage in this practice.

But communication skills, like critical thinking skills, suffer from over mention and under teaching. There is a tendency to assume that people already know how to do these things, and that they don’t need much support from their teachers. As one syllabi exhibiting this assumption puts it:

Just like teams in any organization, occasionally stress and conflict develop within a group during the term. I expect you to work diligently to communicate openly with each other and to attempt to resolve your problems independently (i.e. without my involvement).

Reporting from the Institute for Applied Research in Youth Development, Aida Balsano has found that, “Decline in individual willingness to take on a role in civic life has been attributed in part also to the lack of sufficient vertical and horizontal communication between and among youth and adults about their personal and communal interests, values, and needs. It is as if there is a sort of invisible divide set up between teachers and students. This divide may serve professional purposes, but it

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appears to hinder students’ formation of civic attitude. Perhaps too many of our interactions have become defined by a social, expertise-based hierarchy which has legitimized the notion that “regular folks don’t have much to offer.”12 Basic communication exercises, such as the written report or the persuasive presentation can be understood as practice in the banking model skill of transmission of information, which are necessary but not sufficient in students’ interpersonal development if they are to be prepared as citizens and scientists for transdisciplinary collaborations.

Communication is more than the way we communicate and negotiate our personal ideas and desires; it is also the way we create understanding across differences, the way we accomplish collaborative tasks, and a primary way we interact with the world.

For John Dewey, communication was key to the functioning and maintenance of liberal democracies.

For everything which bars freedom and fullness of communication sets up barriers that divide human beings into sets and cliques, into antagonistic sects and factions, and thereby undermines the democratic way of life. Merely legal guarantees of the civil liberties of free belief, free expression, free assembly are of little avail if in daily life freedom of communication, the give and take of ideas, facts, experiences, is choked by mutual suspicion, by abuse, by fear and hatred. These things destroy the essential condition of the democratic way of living even more effectually than open coercion which—as the example of totalitarian states proves—is effective only when it succeeds in breeding hate, suspicion, intolerance in the minds of individual human beings.13


Following a review of the literature concerning communication and sustainability, the chapter seeks to identify the degree to which transdisciplinary communication practices in sustainability degree programs can be understood as conducive to something like Dewey’s vision for the integration of scientific, technical and vocational content with liberal content, toward the achievement of freedom and fullness of communication.

Environmental Communication and Sustainability

Contemporary arguments concerning the relationship between improved communication skills and the achievement of sustainability occur across a range of interdisciplinary and disciplinary literatures. “Environmental Communication” is a prominent theme within sustainability education and environmental education journals, and is itself a sub-field with its own associations. The International Environmental Communication Association (IECA) hosts yearly conferences, and the ICEA’s most prominent conference is the annual International Environmental Communication Conference (IECC). United States president-elect Donald Trump is running on a very negative and racist platform. He promises “to build a great wall – and nobody builds walls better than me, believe me – and I’ll build them very inexpensively. I will build a great, great wall on our southern border, and I will make Mexico pay for that wall. Mark my words.” Never in my lifetime has a viable presidential candidate run on such a hateful message of division, racism, and overall fear of diversity. Many in the press cannot help but draw parallels between Trump’s message and the outbreak of fascism in Europe, nearly a hundred years ago, which followed intense economic hardship in Germany in the 1920s (Russell Berman, “Donald Trump’s Call to Ban Muslim Immigrants,” The Atlantic, December 7, 2015; Sam Sanders, “#MemeOfTheWeek: Comparing Donald Trump To Hitler,” NPR.org, accessed March 15, 2016). At the same time Trump is fear mongering, he accuses others of fabricating what is unquestionably the most global challenge humanity has ever faced – climate change (“Donald Trump On Climate Change: ‘I Believe There’s Weather’,” The Huffington Post, accessed March 31, 2016). Nearly a hundred years ago, as Hitler was rising to power, John Dewey was writing in the United States about the important role of communication in the achievement of healthy and ongoing democratic change-making. Following developments in the natural sciences, and committed to the potential of education and open communication, Dewey saw that, rather than become further divided and stalemated regarding the increasingly complex problems of a globalized society, people must come together to improve the decision making ability of whole publics, through improvements in communication and a deeper investment in communication as part of decision-making processes (Axel Honneth, “Democracy as Reflexive Cooperation: John Dewey and the Theory of Democracy Today,” Political Theory 26, no. 6 (1998):773). The current presidential race is a dramatic sign that now more than ever we need education that prepares us to critically appraise and see through misinformation, to present our own causes in a way that can resonate with others, to utilize communication to improve our ability to relate to each other and work together.
recently published conference proceedings include topics such as deliberation, collective action, collective natural resource management, systems literacy, ecotourism, conservation, fracking, risk, teacher training, carbon capture, evidence-based claims, masculinity, neoliberalism, and citizenship. Such a list is suggestive of the range of academic and professional contexts in which sustainability students might first encounter, develop, and then practice communication skills toward the co-management of flourishing environments and the ongoing achievement of just sustainable democracies.14 The Institute for Environmental and Sustainability Communication, in Luneburg, Germany, as well as the Global Initiative on Bio-Diversity Education program focus on “stimulating and coordinating networks composed of new information technologies and traditional communication mechanisms.” The International Union for Conservation of Nature Communication and Education Commission (CEC), which is made up of 600 invited environmental education and communication experts from around the world, has expanded its mission since 2008 to “integrate communication and education skills, along with skills for organizational development and social learning.”15 The organization means to facilitate the co-creation of sustainable solutions through creative, strategic communication platforms.16

Within the sustainability literature communication is discussed in terms of organizational change, collaborative endeavors, and as a social learning process rooted

14 Communication for the Commons: Revisiting Participation and Environment, IECA, Turtle Island Press, 2015


16 Ibid., 106.
in information processing and creating. Sustainability educators identify communication skills as especially important in solving problems and participating in social situations where ambiguity is high or complexity unavoidable: “With the growing awareness of the complexity of current environmental crises, we find that the boundaries between education and communication are blurred and strategies from multiple fields are called on to improve public involvement and solve complex problems.” In service to community forum building, communication is “one tool designed to provide information, enable participants to ask questions to experts and create an open atmosphere for discussing an issue,” and has been shown to promote community understanding and buy-in of proposed development concerns, and in other instances shown to improve the opportunity for more socially just decision making. Enhanced communication at the scale of particular cultural contexts is reported to be invaluable to processes of “embedding” in a place, and preserving important traditional knowledge.

Interviews with sustainability educators suggest that students need small wins that can empower their sense of self-efficacy or agency, but that it is also important that students face the small struggles of dealing with real people and real complexity.

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Educators stressed that students encounter many different perspectives and interests in the world. Educators believed that student activities which require them to connect and practice interaction with difference are important preparation for real world problem solving. For example:

Students start out thinking, you know, if people just start thinking differently we can change the whole world, and then when they get to working with other people, who may have diverse opinions from them they begin to realize, their ideal cannot be accomplished overnight. That there will have to be sacrifices, and they can’t do exactly what they want to do.21

Alongside communication skills related to problem solving, deliberation, environmental management, and culture, the literature also includes examples of student analysis of communication media. In the Wageningen University Applied Environmental Education and Communication course, for example, students “deconstruct and deframe” McDonalds happy meals, critically examining the targeted cultivation of public perception and personal beliefs, and analyzing these beliefs alongside scientifically sound information.22

Communication is at the core of conversations regarding institutional support for sustainability-related research and teaching in higher education. Sustainability is an interdisciplinary endeavor, and so those engaged in it will be engaged in work with interdisciplinary teams - this will require extensive skills in communication. According to one report, if higher education will be “a change agent for sustainability,” it must confront “challenges associated with limited cross-disciplinary and inter-disciplinary

21 LA

communication that could foster and enhance collaborations to address the integrated and complex challenges facing sustainability.” As Fiore (2008) explains, the complex challenges of sustainability are the great challenges of the 21st century; they “cross disciplinary lines, and require that specializations not only share relative results with one another, but actually work together in the co-production of knowledge. Interdisciplinary research has in such a way been linked in the literature with “team science.” Team science is an increasingly common approach to sustainability science. Lindenfeld et al. (2012) review the relevance of environmental communication research to sustainability science, focusing on three opportunities at the nexus of these fields: improving public participation processes, improving collaboration across institutional and disciplinary boundaries, and overcoming an overly simplistic or one-way transmission approach to the dissemination of scientific knowledge.

In summary, the literature recognizes ongoing and emergent characteristics of communication education’s contribution to sustainability, exploring pedagogical developments and learning goals based in oral and written communication, in support of dialogic and critical reflection, cooperation, and social learning.


Prevalence of Transdisciplinary Communication in Sustainability

A range of sustainability journals were searched via Google Scholar for prevalence of articles that include reference to transdisciplinarity and communication skills. This initial search provided a context for the analysis of syllabi and program descriptions that followed. This search revealed that communication is not as prominent a subject within transdisciplinary discourse as one might assume, given its important place in the achievement of successful transdisciplinary collaborations.

Figure 6-1. Transdisciplinarity and Common Correlates

The search did not return very many articles with transdisciplinary in the title, though there were a great many articles that include the term transdisciplinary somewhere within the article, with the most common occurrences existing within *Sustainability Science* and the *International Journal of Sustainability in Higher Education*. 
Education. Systems thinking occurred as a term within articles that also include the term transdisciplinary more than communication or collaboration. This suggests that transdisciplinary is discussed largely in methodological and epistemological discourse, more than it is referenced in terms to basic skills in communication and collaboration.²⁶

Out of 82 sustainability degree programs, nearly half referenced communication explicitly,²⁷ but most of these references were not to skills development. They included reference to the names of courses, such as Composition and Communication, or the names of concentrations within the program, such as Environmental Communication.²⁸

8 of the program descriptions mention communication skills or tools explicitly. A great many others include options to take communications courses but don’t highlight communication as a fundamental aspect of the program.

Nearly all the sustainability courses analyzed contained some trace or artifact of communication skills. Running a general word search of the syllabi using a range of communication-related terms, 99% of courses are returned as relevant. References to communication occur as general statements of communication policies within the classroom, such as:

Ancillary materials involving this course are found on the Moodle site and on the publisher’s textbook website (http://highered.mcgraw-hill.com/sites/0072452706/) Course announcements will periodically be made through Moodle or email. Please check your personal EMU email as well as the Moodle course site periodically for information related to this course. Students are invited to correspond with the instructor via e-mail.

²⁶ A similar trend was found within sustainability programs that explicitly used the term transdisciplinary or transdisciplinarity (systems 15, communication 6, collaboration 2).

²⁷ 39 of 82 (47.5%)

²⁸ Though not all program descriptions include course listings, communication course titles within those that do include such titles as Introduction to Speech and Communication, Intercultural Communication, Principles of Communication, Small Group Communication, and Business Communication
The instructor will endeavor to answer emails within 24 hours; emails received after 10pm will likely be replied to the next morning.\textsuperscript{29}

Or

Please do not contact your instructor to answer any questions that are available to you in this syllabus, you may not receive a response. During the work week (M-F, 8am-5pm) I will try to respond to e-mails as soon as possible and within 24 hours. I do not check e-mail frequently during the weekend, so if you send a message to me after 5pm on Friday afternoon, do not expect a response until Monday. If you do not receive a response from me within 48 hours, please re-send your message as it may not have found its way to my inbox. All communications (electronic and otherwise) that you have with me and your fellow students in this course should be professional. This means using proper grammar and sentence structure in your communication. Any aggressive or inappropriate emails will be reported. Make sure to put your last name followed by the course number with schedule line number in the subject.\textsuperscript{30}

In fact, these blanket statements are important in helping students establish consistent and well-executed communication. Research shows that establishing group norms early on is key to successful collaboration, and norms regarding communication are perhaps the most important of all.\textsuperscript{31} But these norms are only an initial formal component of experiential skills practice, and so the analysis of the syllabi eliminated such references, resulting in 33\% of the syllabi with explicit communication skills activities. Within this subset, there was nearly equal prevalence of transdisciplinary communication skills practice and banking model communication skills practice.


Figure 6-2. Two Approaches to Communication Skills

An example of a banking model approach to communication skills reference within a course’s learning outcomes specifies the skill of information transmission, rather than interactions for interpretive possibility:

Students will understand and learn to effectively communicate the concept of sustainability, the practical issues it involves, and the interdisciplinary nature of its concerns, with particular attention to humanistic dimensions.

An example of a transdisciplinary approach to communication skills involves students interacting with non-academics, engaging in specific problems, and contributing to the debate:

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32 05G
A grassroots group is trying to prevent a chicken processing plant from locating in their community. We will visit the community, speak with those involved in the issue and write papers on the issue.\textsuperscript{33}

Thus, communication skills practice in sustainability courses occurs in both transdisciplinary and non-transdisciplinary ways. Transdisciplinary communication practice includes many of the basic communication skills practices, such as presentation and discussion, while also including learning for improved receptivity, or ability to listen, and a broader level of interactions with perspectives and opinions.

Discussion is the classic example of communication skills practice that is not necessarily transdisciplinary, but discussion activities can include significant transdisciplinarity. The following section compares types of discussions, and the focus of discussions, to better make this distinction, contributing to the clarity of concept for transdisciplinarity in education.

Often discussions are described as an event, which suggests the skill is already achieved, or improved automatically though the occasion to practice. For example:

This class is discussion based, so active student participation is essential. You will be expected to have done the assigned readings and be prepared to discuss them\textsuperscript{34}

Or

Communication skills are essential in promoting change; therefore, this class will build upon your speaking, writing, and organizational skills so that you may become better agents of change—towards whichever passion you choose.\textsuperscript{35}

\textsuperscript{33} 21A

\textsuperscript{34} 05B

\textsuperscript{35} 06A
Communication skills in such courses is assumed to occur as an automatic outcome of practice, without need for more refined activities, explicit learning outcomes, or readings tailored to the improvement of communication.

The analysis also revealed more transdisciplinary approaches to discussions, such as courses that assign a class to a student or a team of students and calls on these students to collaborate and run the discussion that day. Criteria for student-led discussion includes provocative questions for the class, reference to current events, and a short game or activity. Transdisciplinary discussion activities offer students a chance to frame the discussion. For example:

Two students will be assigned to act as Discussion Leads for each article. The Discussion Leads for a given class will lead the class discussion. They should introduce the article (summarize its arguments) and propose 3-5 question to the class to initiate the discussion. Then they should animate the discussion: call on fellow students to comment, make sure everyone has an opportunity to speak, if the discussion sags make provocative comments. You may use PowerPoint or other visualization media, but this is not required (The two students assigned as Discussion leads for an article should meet before the class discussion to coordinate their roles.) The Instructor will assign a grade to each Discussion leader based on how well they prepared and how successful they were in stoking an animated discussion among their colleagues.\footnote{68F}

As a discussion pair, students are more likely to have to work to integrate their interests and perspective, rather than merely projecting their individual understanding. This gives students experience with negotiating the context of the classroom, and a student peer. Working across contexts is identified in the literature that links communication with civic engagement, as an important strategy for getting beyond an
understanding of communication as information transmittal or merely a behavior change tool.\textsuperscript{37}

Within the sample of syllabi, discussions offer students the experience of interacting with a diversity of perspectives and ideas in the classroom. At the same time, the fact that multiple perspectives and opinions will be in play is part of what makes sustainability scenarios complex and challenging.\textsuperscript{38} Practicing discussion within a plurality can also link the formation and expression of personal beliefs and opinions with pressing sustainability issues.\textsuperscript{39} The formation of personal values and opinions, alongside the consideration of the best scientific evidence, is at the root of productive discussion as well as democratic citizenship. Educators explicitly support this democratic perspective in sustainability course designs, emphasizing the student’s role as co-framer of the discussion, and a co-creator of knowledge. For example:

\begin{quote}
Take risks in class discussion. Don’t be afraid to disagree with your classmates or with me. Just have a reason for your opinion. Think for yourself. I will reward thoughtful, independent thinking even if I disagree with it.\textsuperscript{40}
\end{quote}

Or

\begin{quote}
Learning occurs by having information conveyed to you (via lectures or readings), but also through discussion and reaching conclusions (individually and collectively) through dialogue. A fair amount of our class
\end{quote}


\textsuperscript{39} “Discuss the role of human values, aesthetics, preferences and patterns of consumption in understanding and making decisions about sustainability.”\textsuperscript{39}

\textsuperscript{40} 02A
time will be devoted to discussion. There are some necessary rules for class discussions to be successful:

• Discussion must at all times be respectful. Learning cannot happen if we are not prepared to treat everyone in the discussion as deserving of respect, regardless of their background or beliefs.

• Remember that the point of discussion here is not to “win” arguments or debates, but to learn. Sometimes this requires trying to convince people that something they think is wrong, but it always requires listening to understand what others think and why.

• Dialogue with others means you will be exposed to ideas that you disagree with, or that you find unsettling, perhaps deeply so. This is what “education” means. As much as possible, treat it as an opportunity, not a crisis.

• Opinions expressed should be backed up by reasons. “That’s just my opinion” is not a reason.41

These descriptions of the educational and democratic role of dialogue mirror the proscription for education which pragmatist scholar James Kloppenberg highlights in the pedagogical writings of William James.42 Kloppenberg calls this approach cosmopolitan pragmatism. He argues that while pragmatic liberal education is based in many ways on independence of mind, the pragmatic sensibility also requires a sensitivity to the differing perceptions and valuations of those around us. It fosters, “a broad perspective that undertakes to understand and respect the perspectives of others, that prizes the ideal of reciprocity, and that recognizes the desirability of carrying that pragmatic sensibility from the realm of abstraction to the realm of daily life by engaging in the practice of deliberation as a means of truth testing and problem solving.”43 These

41 32A


43 Kloppenberg, in Orrill, 1997, p 74
encounters are meant to facilitate students’ appreciation of diversity. When successful they provide students with an experiential understanding of the difficulty of speaking across difference, and the need to develop a range of strategies.

Sustainability educators develop dynamic student experiences for communication skills practice through experiential learning strategies, such as role playing simulations, and extensive debates where students may over the course of the semester represent multiple sides of an issue. Only three of the syllabi included role-playing or simulation communication practices, and only four courses included a debate component.44 One educator described the value of this kind of student experience in an interview45:

I think a lot of times especially with environmental issues, students feel like there is a right answer and it’s just a matter of, whatever, badgering or, you know, convincing. These kinds of simulations hopefully get them to

44 For example, one syllabi states: During the first week of class communities will need to self-organize, including the development of a group communication strategy and preliminary strategy for accomplishing the required tasks. Communities will need to become familiar with their history and interpret their current status relative to an understanding of their assigned “community capitals” scores. This is the opportunity for the community to determine “who they are” which will greatly impact their reactions to future opportunities and challenges.

45 The educator described the basic set up for the simulation in the interview: One was an environmental justice and equity class I taught. We did a climate change simulation. And then I did a course on politics and water where we did one in there too. These are basically structured the same way. They are both classes of about forty or so students. I organize them into groups of two or three and then each of those groups either represent a different country, a different government, or in the water one, about half of them represent governments and half of them represent NGOs. and they are presented with some kind of problem that they have to come together and solve. For the climate change one, it was come up with some principles for post Kyoto, like what kind of climate treaty do we want. For the water one I have done a couple different versions of it, but it’s always about rules for international trade in water. So you get, some of the countries are water importers, some are water exporters, and then environmental groups and business groups. Getting them to see the way different groups or states have different kinds of interests, and to try and get them to make political arguments for particular kinds of solutions and see that other groups have other kinds of interests. Its fourteen weeks, and the simulation usually goes over two weeks, usually about two thirds of the way through the semester. So I use the beginning to sort of give them the background knowledge that they need. Usually about four or five hour classes to do the actual simulation part, and then one more class, right after that, to talk about it, reflect on it, and then they usually have to write a paper. It’s done a couple of different ways, but usually it’s just a reflection on the experience. Sort of like, what did you learn about this either in terms of the issue or in terms of negotiation, those kinds of things.
understand that actually there are real conflicts about what is the best way to resolve these issues ... there are others of us who are, you know, we have a different set of things that we want to teach our students that are important to the environment and to sustainability issues. The capacity and our willingness to think about these issues not just as technical problems, so you know, the simulation is one way to get people to think about negotiation in that kind of way. It's about cultivating being able to listen to other people's arguments and to figure out why people have the beliefs and values and interests that they do, and not just to say we need to teach them to behave differently, but to understand the why and how of those behaviors in the first place.\textsuperscript{46}

As this interview excerpt specifies, communication isn't always about speech acts, and communication education isn't always about articulation and verbalization, or even practice with other expressive mediums. Practicing communication skills includes receptive and interpretive practice toward the social development of understanding.\textsuperscript{47} Educating students to be receptive listeners does not intend to override their cultivation of a personal value system, however. Experiments by educational psychologists at the University of Amsterdam found that dialogic experiences in citizenship education do far more to advance students' personal opinions on important moral issues than standard approaches to material.\textsuperscript{48} Interaction with deep disagreement is an important part of democratic communicative practice.\textsuperscript{49}

The National Task Force on Civic Learning and Democratic Engagement (2012) identify listening as a vital component of democratic societies. Listening completes the

\textsuperscript{46} ZA


\textsuperscript{48} Schuitema et al., 2009

skill set of effective dialogue. Forums for citizenship, such as Junior School Congress, Model United Nations Conferences, United Nations Youth Forums, YMCA Youth Parliament, rely heavily on communication skills, including listening skills; “These activities provided relevant and purposeful ways to hone skills and practice listening, networking and negotiation, debate and argument, problem solving, public speaking, persuasion, decision making and meeting procedure.” Explicit attention to listening is identified as an important component of contemporary political deliberation and can increase participation in citizenship activities. Similarly, public speakers champion the value of listening. Julian Treasure is a sound expert whose TED talks rate in the top 20 of all time. He has for the last decade argued that communication, and especially listening skills, should be taught in our schools.

Only 8% of the sustainability syllabi refer to listening or include readings regarding listening. There appears to be a discrepancy between the components of deliberation identified in the literature, and what is explicitly included in course syllabi. To move beyond an understanding of communication skills as transmission of information to a more transdisciplinary approach, is to look for classroom practices that


52 For example, “a particular type of political discourse that emphasizes the importance of listening to and thoughtfully considering multiple perspectives on issues, sometimes with a goal of promoting group consensus or compromise. Among adults, there is evidence that engaging in face-to-face political deliberation can increase participation in some kinds of civic activities, though it does not tend to increase participation in electoral politics” (Jacobs, Cook, and Delli Carpini 2009) cited Elizabeth Beaumont, “What Does Recent Research Suggest about Civic Learning & Civic Action in Young Adults 18-30?: Some Insights and Foundations for Further Work” (Spencer Foundation), accessed June 4, 2016, http://www.spencer.org/sites/default/files/pdfs/ElizabethBeaumont.pdf.

support two-way, interactive communication, the development of novel interpretations and understanding, and improved listening skills alongside speaking and writing skills.

Structured discussion activities are one way the sustainability courses in the sample offer students practice listening. Handouts that prompt students to record what they hear as they are listening to a peer, and activities that practice observation of body language and other aspects of non-verbal communication are supportive of active listening practices. Developing the ability to listen contributes to one’s own voice and perspective. And educators in interviews report that students are engaged when they are sharing and listening to their peers.

Communications practice in sustainability courses often involve presentations. Conventional approaches to presentation assignments focus on the clear presentation of facts, arguments, and opinions. Assignments that manage to exhibit transdisciplinary characteristics organize these assignments to connect with experiential, relevant aspects of the student’s lives, so they accomplish more than the collection and regurgitation of information. These assignments give students an opportunity to develop a local context for community-based action for sustainability. The local context provided by these assignments develops students understanding of local organizations and local issues that are sustainability relevant. For example:

54 For an example of an activity that improves active listening through structured student activities, see Seaton Tarrant, “Dig in and Discuss: Using the Insights Questions and Challenges Framework to Improve Students’ Environmental Communication Skills” in Byrne, Lauren (Eds.) Learner-centered Teaching Activities for Environmental and Sustainability Studies, Springer, 2016.

55 Olga Ebert, Michael L. Burford, and Donna Jg Brian, "Highlander Education for Change," Journal of Transformative Education 1, no. 4 (October 1, 2003):.330.

56 “importance of reading comprehension and writing skills as prerequisites for good research”
News Reports. You will be required to report on a current environmental issue or event reported in the newspaper two times during the semester. At least one of the two news articles should be reported prior to the midterm break. The second newspaper article must be reported before we reach a week prior to the last day of class for the semester. No write-up is required. You should present to the class a short summary of the news article. In presenting your summary, you are encouraged to look for ways to stimulate follow-up discussion by the class.\(^{57}\)

Students can also practice communication and listening in a transdisciplinary way through exposure to perspectives not traditionally present in the classroom environment. Beyond the banking model of communication as persuasion, participation in decision making benefits from qualities of attention, goodness, and compassion, “supported by regenerative acts such as learning, relating, and listening.”\(^ {58}\) Cultivating these qualities within students is arguably the goal of sustainability course experiences that most obviously embody transdisciplinary communications practice: the use of non-traditional or non-expert guest speakers.

Interviews with sustainability educators indicate a variety of guest speakers ranging from United Nations representatives to industrial designers, to hardcore vegans.

Another thing that’s important, the farm director I work with, she comes to the second class meeting and has an honest discussion with the students, to debrief them and to raise some critical questions about the folks that they are going to be helping and working alongside. It’s an imperfect process because you can never do enough, but it’s important to really be careful of casting ourselves as educators and a college group coming into a community as authorities or experts or drivers and really approach that partner with respect and a sense of collaboration, and really invite them to

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\(^{57}\) 60B

fully help us to set the agenda for what we want to accomplish for the semester.\textsuperscript{59}

Or:

I try to make it easier for them by bringing in community leaders that I can trust and that I know will help them. We have a program here on improving the downtown streets, and the head of that program comes to the class and talks about all the issues connected to improving downtown, environmental sociological issues, and he says, “We need your help, I’m happy to meet with you and talk about how your interests may help us address these problems.” For instance, there was a bed bug problem, students worked on this. First time home buyers, students worked on this. So, finding local champions, community leaders, who can work with you is really important.\textsuperscript{60}

Educators in interviews specify the importance of the inclusion of community members in the classroom, and also of bringing students out into the community. The cultivation of relationships within the community thus becomes an important aspect of transdisciplinary educator practice.

In addition to guest speakers, a renewed focus on communication and especially listening can revive student interest in campus-level experiential projects as well. The campus tier of experiential learning in communication skills is an especially interesting one. On the one hand, campus-based communication practice is especially common, such as tabling on campus to represent a cause or student club. On the other hand, it is also the sort of experiential communication practice that some sustainability students evaluate negatively:

Student 1: Yeah, it’s hard because part of the whole experience is being a little scared. Knowing, okay, we have to actually go out and do this. If it had been a classroom setting and even to some extent a campus setting, it would have been different because we’re really comfortable in classrooms.

\textsuperscript{59} AD

\textsuperscript{60} VC
and on campus, part of it is about getting pushed off the cliff and having to do it. But it might be possible to do it on a smaller scale.

Student 2: Even if we didn’t achieve everything in this community project, it set us up to make bigger changes in the long run too... I frankly get bored with doing the same damn projects on campus all the time, so taking it off campus actually got me motivated and I felt more invested in it, and I feel like I’ll probably still be involved in this issue, and if I was on campus I’d probably get tired of it.

Tarrant: What is it about campus projects that you don’t like?

Student 2: Generally, it involves spreading awareness. I feel I’m being so pessimistic saying this, but the campus projects often feel a little petty like they’re not making a huge difference and they’re just stuck on campus.

Student 3: Most times they’re like, pick a topic, make a presentation, go tell some people.

Student 1: Exactly, in this horrible class I’m in we just did that. We had a day where we set up in the Atrium and we set up a table and we were like trying to stop passing people and tell them, “Stop, you can get some free food if you come listen to us,” and people were like “oh god, no.”

Student 2: Yeah those are the kinds of things you run from.

Student 1: It was just terrible and it makes me feel bad, like I’m not accomplishing anything. You don’t feel like you’re doing anything. You’re connecting with students who are probably dealing with similar projects in their own classrooms and you’re not really engaging anyone, it just doesn’t feel real…

It may be that there are other causes for students’ hesitation to engage in campus level communication practice. In a 2013 open ended survey of students graduating with a sustainability studies degree, half the students wrote that the most challenging degree related experience outside the classroom was communicating with non-sustainability studies students. In 2014 a quarter of all students taking the same open ended survey identified this same challenge. Campus-level projects could give students practice with the challenge of interacting with peers from outside their degree program, and outside the sustainability frame of reference. It may be that students need
more support in preparation for these activities, so that they too are offering their campus-level peers something more than a banking model transfer of information. Transdisciplinary approaches to student-led campus-level communication projects were not found within the sample of syllabi. As an area of future action research, these might be based on more receptive communications practices, such as students collecting the perspectives and opinions of other students, or students offering a creative medium for other students to participate in the information sharing, such as large murals, collective pledges, or participatory hashtag campaigns.

The online environment is another important location for transdisciplinary communication practice in sustainability programs. There are ways to connect online experiences with critical analysis of how one’s own experiences in the community are then represented by media. The online environment can provide a virtual learning space in which students “take ownership of the material and use their knowledge to lead one another without prompting from the teacher.” The online environment is also used in sustainability courses as a space for student-led tutoring and relationship building, and as a platform for active reflection.

Students and educators alike are spending more and more time online. The verdict is still out regarding the consequences of this fact for cognitive and

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61 “How does social media communicate beyond the people who are there at the protest, to the wider community? That’s one of the really unique parts of the class because so many of my students already are activists. And so the class has become more and more a place where we think about activism as a form of political engagement, and it leads to a lot of analysis of social media and how that media is part of the strategy now” EI

62 Ibid.

Poorly implemented, online learning can automate too many tasks, creating a one-size fits all impoverished educational experience. When online learning is well-integrated with the best of experiential classroom and community-based learning, students are well prepared, achieve more learning outcomes, and spend more time on task.

Communication is one of the most fundamental, intimate, and challenging ways that students interact with the world. Now that this world includes an immense and growing “virtual” environment, there are opportunities in activities such as blogs, discussion boards, and social networks to practice new and existing skills in communication. As more and more decision-making occurs through these electronic channels, it is likely that citizens will be called upon to intelligently receive, interpret, create and share all manner of information and experience, including information and experiences that are key to civic practice. Transdisciplinary online student assignments can enable communication across vastly distinct cultural and economic

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situations. For example, students on different continents can be asked to link up and work together to design a sustainability solution to a community-identified problem:

Each team will develop a product concept and prototype during the semester in an engineering studio, working in partnership with a village in Africa, Asia or South America. You will communicate directly with the village to understand the problems, culture and resources. The list of potential projects includes development of a prosthetic foot for amputees in India, a crop drier for converting waste to charcoal fuel and fertilizer in Haiti, a drip irrigation system for farmers in South America and improved stoves in Ghana.

Online communication assignments can offer students the opportunity to iteratively work and rework their communication creations until they find they are ready to be sent out. This can generate more time on task than assignments which are presented in real time, with little practice, and less opportunity for feedback. This argument for the iterative quality of online learning was discovered in an interview with a sustainability educator who had worked extensively in the development of online programming.

So you know we say it’s important that students can communicate, but then how is that possible online? To find out we did a trial to demonstrate that it was possible and it can be fun to. It’s easy to think about how

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68 Despite these opportunities, online learning suffers from criticisms regarding the tension that exists between local embedded concerns, and the virtual, global connection that is enabled by the Internet, summarized as “the tension between the need for global communication in order to mobilize, and for resonance among place-specific collectivities.” Maribel Blasco and Hans Krause Hansen, “Cosmopolitan Aspirations: New Media, Citizenship Education and Youth in Latin America,” Citizenship Studies 10, no. 4 (September 2006): 472. Notwithstanding these criticisms, my own action research in online environments has shown that educators can assign online tasks that require students to connect with whatever place, community, or natural environment they find themselves in. David Orr wrote that all education is environmental education, and it is my belief that this is the case not only because the environment is where we measure and judge the impact of our actions in the short and long term, in terms of environmental quality, ecological footprint, and so forth. It is also the case because sensitivity to the environment, in the spirit of foundational experiential education pedagogue John Dewey, is the way by which we as teachers design student experiences that contribute to a holistic and integrated learning opportunity, in which one might recognize and practice a range of communication skills, and where one can practice membership or citizenship in a range of communities, while still embedded in a place. Indeed, this is what is meant by glocalism.

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learning to live together can be a constraint in the online learning mode. To speak real practically, I’ve sat in face to face classes and students get up and do a presentation and then straight afterwards I give them feedback while it’s still fresh for them, but really that’s the end of the experience, and they never see what happened and so forth. For lots of people, speaking in public is a nerve racking experience and so for me to give them feedback at that time it might be going right in one ear and right out the other, but if you’re doing it online you can record your own presentation and then play it back and say, ‘aw that’s rubbish,’ and then try again. So there’s a real opportunity to work on communication skills, you can’t sit through it twenty times in the classroom; but online there’s more encouragement to work on it and try again before you actually present it to others.\textsuperscript{70}

This excerpt from an educator interview further confirms the literature’s suggestion that one of the primary benefits of online learning is increased time on task.\textsuperscript{71}

However, the benefits of online learning are not guaranteed by the technology, any more than a book’s binding guarantees comprehension of the content of its pages. Achieving a successful student blog is not as simple as creating a Wordpress shell. Blog assignments are in many instances just another iteration of the passive approach to education as the consumption of information. To this point, 21% of the sustainability syllabi included blogs, but half of these did so merely by assigning students the task of reading someone else’s already existent blogs. This was the case even in a course that specified in its learning outcomes the task of “understanding the ins and outs of blogs.” Of the half that did assign students the task of creating and actively participating in blogs (around 10% of total syllabi), 2 were assignments to create an individual blog, and the rest involved students working together on collective blogs. The amount of

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\textsuperscript{71} Means et al., “Evaluation.”
course credit given for blog assignments varied remarkably from 5% to 50% of total credit for the course.

In two years of action research comparing the student produced content of two different types of student blog assignments, it was found that blogs can be fairly passive learning experiences, where students merely go through the motions, or blogs can be the site of rich and passionate conversation and debate, a space for knowledge creation and deliberation that students can call their own. The first course including a student blog for this comparison, “Blog 1,” required that students pick one passage from the reading that week, post it, and reflect on its meaning and importance. No more of a rubric was provided, and the blog was graded as ‘complete’ or ‘not complete’ each week. The second course, “Blog 2,” included an extensive assignment outline. It required that every week, two or three students each write a “discussion prompt,” based on the discussions and/or readings from that week. The discussion prompt should connect the week’s work with a current event, and it must include three hyperlinked references to related information on the web. The act of communication by composition has been irrevocably affected by the communicative acts of embedding links and utilizing open source content. Lastly, the discussion post must include a provocative image, something to draw readers in and catch their interest in the topic. Each week, the rest of the students respond to one or more of these prompts with comments, and brief replies.

Blog 1 garnered no additional online discussion between students, even though students were required to comment on other’s posts every so often. Blog 2 initiated a great many discussions, as multiple students were responding to each prompt, and
bouncing off of both the main prompt, and the comments of other students. Students in this blog would sometimes reply three or four times to a single discussion thread, in discussion threads that sometimes included up to twelve or thirteen students. In Blog 1 it was common for the students merely to express their agreement with the prompt, that they thought it was “cool” or “definitely the right idea.” In Blog 2 students were not agreeing with text, but challenging and finding agreement with their classmates, not merely about ideas, but about the importance of certain ideas and methods applied to real world situations.

Furthermore, students write longer blogs when they are responding to each other, than when they are merely commenting on the text. The average length of a blog in Blog 1, where blogs were direct reactions to the text, was 153 words. In Blog 2, where students responded to their peers’ discussion prompts, the average number words in each blog was more than double that of Course 1 (374 words). Thus, the transdisciplinary online assignment increased time on task considerably, These data are provided as one example of the potential benefits of a transdisciplinary approach online assignments that gives students ownership in the framing of discussions and flow of the conversation, and that allows them to make connections across spheres of expertise, using the great web of knowledge that is now at their disposal.

**Assessment and the Role of Reflection in Communication Skills**

To the extent communication skills are developed through experiential learning, reflection-based assignments are often the last form of communication practiced. These commonly occur in sustainability courses as written reflection assignments, and also through the use of in-class presentations and other social reflection strategies that include a more transdisciplinary approach.
Reflection is commonly considered to be the lynchpin of experiential learning, and, as suggested earlier in the dissertation, openesss to the possibility of whatever a student might discover in their personal reflection is an important component of education that engenders a commitment to social wellbeing without compromising individual identity development. In reflection assignments students are challenged to communicate new articulations of their identity, charting how they have changed as a result of the experience, their values, what they have learned, the challenges they faced, the success and failures they incurred. Reflection provides students with the opportunity to make connections across contexts, interests, and disciplinary spheres. Written assignments prompt students to reflect on the meaning and value of what has occurred over the course of the semester, along with organizing and recalling information that was presented as part of the learning process.

Within the sample of sustainability syllabi, 24% explicitly include reflection, and 9 of the syllabi (less than 10%) include a journaling assignment. Journaling contributes

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75 To improve the experiential potential and meaning-generating quality of written assessments, they might be executed as a personal exchange between the student and teacher. For instance, initial written exchanges might literally be presented as a letter writing task, during which time the teacher can identify any students that need significant help with the basics of written communication. These students can be required to run any remaining written assignments through the writing lab or through the editing process of a peer or helper prior to submission.

76 Journals can include reflection assignments based on class readings, on community projects, on charting one’s waste habits and energy uses. Journals can also be used as a basis for a range of
to the transdisciplinary character of a course by offering students a space all their own, where they control the flow of ideas, the medium of expression (to a degree), and the frequency and depth of what they contribute. Journaling typically occurs out of class, which means it doesn’t compromise already limited class time, and it needn’t be subject specific, which means it is worthy of consideration in natural science courses as well, where journals can be used to connect the scientific processes with public applications, with historical development, with contemporary political debates, or with career possibilities.

Student assessment in sustainability courses also include communication practice in the form of final presentations. The transdisciplinary form of this assignment includes assessment by fellow students and relevant community partners as well. This transdisciplinary strategy is shown in the following:

**Presentations (oral):** Near the beginning of the term, student groups will present (10 min.) their proposed research report topic to the class for feedback and questions. Groups will present a research update report in class three weeks later, in preparation for their final presentation. Near the end of the semester, students will deliver a 5-7 minute Pecha Kucha presentation summarizing their group research report for an external communication activities with other students and the instructor. If journals are periodically collected instructors can provide ongoing feedback and develop understand of each students learning process. If students write journal entries in preparation for one-on-one discussion with a classmate, the journal becomes a space for reflecting on the success or failure of communicating one’s ideas. If provided with a rubric, journal entries can be supplemented each week with a reflection assignment in the journal where students write about the one-on-one communication exchanges had during that week’s discussions with peers. Journal writing can be prompted with images, songs, quotes, and an especially insightful comments from another student during that week’s discussion. Journals can be completed online, for ease of handling when class size is large, and journals can be collected multiple times throughout the semester, so students that are less familiar with this activity can receive feedback on how well they are engaging with the assignment. Pairing especially strong journal writers with first time or timid journal writers is another strategy for introducing this form of assessment.
review panel (i.e., comprised of researchers from within the School of Environment and Natural Resources or the wider university) using visual support such as PowerPoint (with additional time for questions).\textsuperscript{77}

Lastly, students can be assessed for transdisciplinary communication skills in organized focus group reflections on group learning processes. Sustainability educators during interviews described conducting focus group assessments that were framed as a professional exercise, and in other instances included members from the community who most benefited or facilitated the student experience. Educators also described one-on-one interview assessments. In such cases the student and the professor meet for a set period of time, and the professor questions the student regarding his/her interests, and how well they’ve integrated these interests and ideas with the information and experiences of the course. While this method of assessment is not appropriate in all cases, it was reported in educator interviews to be a helpful way of assessing student transformation while also providing students with a personal feedback opportunity. While this assessment method seems time consuming, if the alternative is essay or paper writing it potentially may take less total time than grading longer written assignments. Plus, presenting the assessment as an interview rather than an oral exam helps students recognize that, as much as assessing a students’ progress, the goal is preparing students for the professional challenges they will face down the road.

\textbf{Science and Communication}

The previous section described some of the characteristics of transdisciplinary communication skills practice within sustainability courses. The transdisciplinary approach was set in juxtaposition with what Paolo Freire called the banking model

\textsuperscript{77} 25B
approach to education, which understands learning as the transmission of information from one source to another. Within science communication, the focus has in the past been on dissemination of findings, and only recently, especially following the rapid development of internet communication technologies, has come to include public debates alongside the provision of information.\(^78\) Whether a course does or does not engage with communication skills development is consequential for civic attitude and aptitude, and also for the potential for science to actually inform and affect policy. One sustainability educator described it this way:

> Creating a rounder understanding of the way that we approach the environment in today’s world - It has to be scientific and it has to be from more humanistic perspectives. Or else, we’re not going to get a full sense of how to communicate these issues. Some people will read the facts on climate change and it will affect them, others the science won’t do it and you need to touch their heart, through stories and storytelling.\(^79\)

It can be difficult for student scientists to practice advanced communication skills, having come from a lifetime of education that is discipline or subject specific, and often following rigorous higher education tracks of technical study, that provide little time for interpersonal skills development. Backstrand’s 2003 article on the science-politics interface, and the deficit model approach to public distrust of science, charts the early efforts to improve public understanding and awareness of scientific findings, through enhanced communication and outreach. However, this is only one part of the role of communication in these issues. It is not just the need for more public acquisition of

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scientific knowledge, but a shift to what Backstrand and others identify as the post-normal science framework, dealing specifically with “issues defined by high decision stakes, large system uncertainties and intense value disputes.”

The review of transdisciplinary communication skills in the syllabi suggests that science can do much more to implement learning opportunities for improved communication at the interface of science and knowledge politics. To begin to understand this, consider that at the program level, sustainability is oriented heavily toward science. Within the 39 programs that explicitly mention communication, as the graph below indicates, there is also mention of citizenship, technology, career and science.

![Communication Skills in Programs & Related Themes](image)

Figure 6-3. Communication Skills in Programs & Related Themes

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81 : 9 sources 32 references returned on civic OR civics OR citizen OR citizenship OR democracy OR democratic; 28 sources 152 references returned on career OR careers OR profession OR professions OR job OR jobs OR employment; Science returned 38 sources 342 references; and technology returned 21 sources 90 references. Comparatively, over the entire sample of program descriptions, the results for this query is Science: 75 sources 798 references; technology: 38 sources 183 references; career OR careers OR profession OR professions OR job OR jobs OR employment: 56 sources 235 references; civic OR civics OR citizenship OR citizen OR citizens OR democracy OR democratic: 17 sources 47 references.
At the program level, one can see fairly clearly that civics and citizenship are low on the list of primary concerns in programs that make explicit reference to communication, while mention of career and science is very high. This finding holds true across all program descriptions (n=82) as well.

At the course level, however, a different story unfolds. Within the sustainability syllabi reference to communication skills is less common, and where it does occur, it occurs alongside career and civics, not career and science. References to civics and citizenship include university-wide “competencies” in citizenship, references to the diversity of stakeholders involved in environmental decision making, reference to classic texts that argue for a renewed civics, such as Paul Loeb’s, *Soul of a Citizen: Living with Conviction in Challenging Times*, and reference to civic agriculture. Communications syllabi also highlight the relationship between professional expertise and citizen obligation:

“Sustainable engineering requires many things of professionals: commitment, respect for values and opinions that differ among themselves, and from the ones we may hold, a willingness to understand and work with social, cultural and environmental contexts. But it also requires that, as knowledgeable citizens in an increasingly technological world, engineers function as leaders within their institutions, communities, and society at large.”

One might assume that a career-focused course would more likely also have an individual focus, and the greatest frequency of transmissive, banking model pedagogy. In some instances, this was true. For example:

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82 33/99 syllabi reference communication explicitly same comparison run: Science 11 sources 50 references; technology 9 sources 77 references; career 12 sources 73 references; citizenship 10 sources 14 reference

83 68A
Writing like your reputation depends on it! As a professional you will very rarely receive a grade for your written work. Your work will affect your reputation, rather than your GPA. Building and maintaining a positive reputation is important in anything you pursue. Your ability to communicate professionally, clearly, and competently reflects on who you are, and the quality of work you do. Both content and presentation matter!84

However, the data suggest that scientific and technologically-oriented courses are more inclined to the banking model, whereas those courses engaged in civic or career topics are more relational and more aligned with transdisciplinary pedagogy. To verify this, all the syllabi coded for communication were analyzed in search of transdisciplinary practices. These courses were tabulated alongside courses that referenced civic, career, scientific and technological issues.

Figure 6-4. Communication Skills Subject & Pedagogy

This finding can be compared with the fairly equal distribution of subject type across all syllabi in the sample.

84 32C
This finding holds, even given the fact of a fairly even distribution of each of the four areas of concern among all the syllabi. Thus, courses with a communications component that also refer to career and civics are more commonly transdisciplinary, and courses with a communications component that refer to science and technology were less likely to include transdisciplinary learning opportunities.

To explore this situation further, primary sustainability education journals, along with *The Handbook of Transdisciplinary Research* were coded for the skillset. Within sustainability education articles that include reference to transdisciplinary practice, communication was mentioned far less than systems thinking. In *The Handbook of Transdisciplinary Research* communication was mentioned the least of all the skills.
The neglect of communication skills practice can alternatively be seen in the word cloud that is auto generated by the content analysis software. The software generates these word clouds as a way to quickly grasp what terms are most prevalent within the text. If there was one place where the importance of communication in the achievement of transdisciplinary practice would presumably be well documented, it would be in within the 500-plus page handbook of transdisciplinary research. However, in measurements of the most common terms within the handbook communication and terms related to communication are not found.
Figure 6-7. Handbook of Transdisciplinary Research Word Cloud

The word cloud illustrates the focus on scientific research, systems modelling, and the project- and problem-based approach within transdisciplinary research. This is in keeping with what Jantsch (1972) called the purposive orientation of transdisciplinarity. But this alone does not explain the near total neglect of communication, given its importance to the achievement of successful transdisciplinary collaborations. It could simply be another manifestation, within both civic and scientific communities, of the stubborn reliance upon an understanding of communication as dissemination and transmission, which requires only that the information be produced and made available.

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85 Cited in Klein, *Education*.

While the link between communication skills and politics, journalism, and the liberal arts is well established, there is a less developed understanding of how contemporary development of transdisciplinary communication skills is helping to define sustainability science, and new approaches to adaptive management of ecosystems. The interpersonal skills practice that prepares students to work together, to disagree peacefully, and to receive and tolerate a healthy degree of difference with open hearts and minds is not commonly found in courses with a strong scientific basis.

Thus, there appears to be evidence in support of Backstrand’s thesis regarding post-normal science:

Problems such as climate change, GMOs or biodiversity, which are fraught with uncertainties, cannot be adequately resolved by resorting to the puzzle-solving exercises of Kuhnian normal science….Peer review should include “extended peer communities” in order to enhance dialogue between stakeholders such as the NGOs, industry, public, and the media. This is in line with the call for a “democratization of science,” i.e. wider participation in scientific assessment beyond a narrow group of scientific elites. However, the proponents for increasing citizenry and public accountability in scientific endeavors are driven not by a general desire for democratization but to make science more effective.  

In the popular press, scientists battle business interests to take seriously the challenges of climate change, but in the sustainability classroom it is often within business classes that communication skills learning, much needed for dealing with these challenges, is occurring. The institutional connection between communication skills and science is apparent, given the fact that science and communication have strong co-occurrence at the level of program design. But this kind of transdisciplinary

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integration is less common at the level of specific syllabi. Is it sufficient for integration of these skills to occur at the program level? It might be fine to take a course on science and then a course on communication, if, in the real world, scientists spent one day experimenting and the next day communicating. But this is not the case in deeply collaborative research. Scientists engaged in transdisciplinary research engage complex problems while simultaneously holding multiple disciplinary lenses, and including non-scientific perspectives and non-traditional expertise in the framing of the problem.

There are opportunities for science courses to better integrate communications practice without compromising an already challenging course schedule. Within the syllabi, courses within bachelor of arts programs were twice as likely to include blogs as courses within bachelor of science programs. Simulations and online debate through interactive and creative blogs are one possible place for the improved integration of scientific courses with transdisciplinary skills practice. Further qualitative research might actively seek out scientific and technological courses that utilize online learning environments to better integrate transdisciplinary communication practice into scientific learning.

**Conclusion**

This chapter reviewed examples from sustainability syllabi and program descriptions to facilitate a better understanding of distinctly transdisciplinary

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88 Degree programs were determined by the information provided along with the syllabi, and by the departments that participated in the research. It is possible and indeed likely in interdisciplinary program design that some of these courses count for both arts degrees and science degrees. None the less, the fact that programs in the arts were twice as likely as the programs in the sciences to include a blog makes intuitive sense. The data is presented only as a means to suggest that the sciences could include communication activities without overtaxing existing lecture time.
communication skills practice. The chapter also identified a distinction in the presentation of communication skills between the program and course levels. It appears that sustainability degree programs appreciate the value of preparing students for both scientific work and advanced communications practice, including experiences that assist in the shaping of personal commitments and interaction with diverse worldviews, but actual course work tends to do one or the other. Communication practice within sustainability courses continue to occur primarily in career preparation and civic-oriented courses, highlighting the ongoing relevance of the liberal arts and sciences, in preparation for democratic participation, and participation in the science-policy interface that is so important for sustainability science. The challenge to integrating science and communication studies more directly remains. The next chapter reviews transdisciplinary collaboration in sustainability degree programs, and spotlights two experiential learning case studies that achieve an integration of scientific learning and interpersonal skills development.
CHAPTER 7
A COLLABORATIVE ENDEAVOR

Introduction

In a recent speech, former Secretary of the Treasury and President of Harvard, Lawrence Summers, proposes a thought experiment: what would education look like if it better reflected the rapidly changing structure of society? His (partial) answer: Education would be more about processing and using information than imparting it, and tasks would be more collaborative.\(^1\) A range of research questions arise from Summers’ sentiment, not least of which, is what do we mean by collaborative tasks, and in turn, what does education look like that offers practice in collaborative tasks?

At the same time, and in apparent contrast to Summer’s call for improved collaboration education, federal leadership continues to promote educational programs with names like “race to the top,” declaring the national imperative, “to create an economy built to last, we need to provide every student with a complete and competitive education that will enable them to succeed in a global economy based on knowledge and innovation.”\(^2\) The competitive environment operates across individual, interpersonal, and experiential education activities, and has been linked with student anxiety, self-doubt, selfishness, and aggression.\(^3\) Students often feel pitted against each

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other in competitive learning environments where one student achieves high standards only by way of another student’s failure to make the grade.

The last chapter examined sustainability courses that included a communications component, and suggested that courses that included civic or career focuses are most likely to include a transdisciplinary communications component, whereas courses focused more on science and technology are not. Science can improve its public relevance and effectiveness by taking seriously the value of the liberal arts, and especially the humanities.4 This notion goes against the grain of the competitive academic model that pits each researcher and his or her department against every other researcher and department, in a battle for available funds. The result, in a society infatuated with the latest electronic invention or internet service, is the wholesale devaluing of liberal arts education, just as it is most needed to buttress the scientific work that is contributing to public decision making amidst complexity.5

Drawing on all the resources and analyses conducted for the dissertation, this chapter argues that the liberal arts has an important role to play in the development of collaborative skills practice for 21st century citizenship. The chapter includes a review of collaboration in a range of literatures, and describes transdisciplinary and non-

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transdisciplinary collaboration skills practice in sustainability courses. Lastly, the chapter includes an examination of two successful efforts to integrate science and civics in sustainability courses in American higher education. Findings related to the integration of science, civic and interpersonal skill development, and the specific role of experiential and service learning are presented.

**Collaboration in the Literature**

Collaborative tasks focus upon interdependent needs, shared norms, influence, and common goals.⁶ Bedwell et al. (2012) conducted a meta-analysis of literature that defined collaboration and concluded with the following definition: “an evolving process whereby two or more social entities actively and reciprocally engage in joint activities aimed at achieving at least one shared goal.”⁷

Beyond this basic mutualism and reciprocity, the concept and consequence of collaboration has been explored in a range of literatures. Matt Lieberman, for example, writes about the dedicated system for social reasoning in our brains.

While we tend to think it is our capacity for abstract reasoning that is responsible for Homo Sapiens’ *dominating the planet*, there is increasing evidence that our dominance as a species may be attributable to our ability to think socially. The greatest ideas almost always require teamwork to bring them to fruition; social reasoning is what allows us to build and maintain the social relationships and infrastructure needed for dreams to thrive…The pain of social loss and the ways that an audience’s laughter can influence us are no accidents. To the extent that we can characterize evolution as designing our modern brains, this is what our

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brains were wired for: reaching out to and interacting with others. These are design features, not flaws.”

Developmental psychologist Michael Tomasello (2008) has suggested that the development of these skills was actually the product of our evolutionary disposition to collaborate. Tomasello suggests that rather than altruism, which he calls “a bit player” the real star is mutualism, where people benefit from cooperation but only if people work together.⁹

Whether one subscribes to Tomasello and Leiberman’s arguments for the evolutionary advantages of collaboration or not, the fact remains that today, as a global population, people face significant challenges to the stability of our ecosystems. Aware of new forms of global complexity, the sciences have begun to collaborate to improve upon our understanding of the changing dynamics within social and ecological interactions. International development and environmental management strategies engage with this complexity through collaborative, adaptive management.¹⁰

In the past, citizenship education encompassed a sense of obligation to one’s community, but only to the extent that obligation required traditional community service, keeping up on current affairs, maintaining one’s property, and participating in elections.

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The expanded obligations of citizenship, following the rise in ecological knowledge and the effects of industrialization and globalization, are at the core of this dissertation. There are drastic shifts accompanying this knowledge, in conceptions of obligation and strategies of education for citizenship. Also important are the basic lessons of citizenship that have carried forward into this new situation. Foremost among these is the fact that an ethic of civic participation is well instantiated when students engage in service and community-based learning, and that these students show increased future civic action and a more positive appraisal of their own interpersonal, problem-solving, and leadership skills, and increased sensitivity to issues of social justice.  

Collaboration in the Academy

Since the 1970s, not incidentally, since the rise in computer-based modeling and the recognition of complex socio-ecological scenarios, there has been more need for collaboration by academics, across disciplines, and beyond the walls of the university. Eric Jantsch was one of the first to write about this, and to employ the term transdisciplinary:

- Looking at changes, and pressures for change, in all three of the primary functions of the university, we may, inter alia, discern the following important trends:
- Education: From training for well-defined, single-track careers and professions (by duplicating existing skills) toward an education which enables judgment of complex and dynamically changing situations--in other words, geared to the continuous self-renewal of human capabilities,
- Research: From discipline-oriented research over pluri- and interdisciplinary research toward research on complex dynamic systems--or, from research on the fundamental level and the perfection of specific technologies to the organization of society and technology in a systems context.

Service: From specialized, piecemeal research contributions and passive consultations to an active role in the planning for society, in particular, in the planning of science and technology in the service of society.\textsuperscript{12}

In a sense, collaboration as a skillset that can be practiced and improved embodies what is most essential about the shift to transdisciplinary learning. Following Jantsch’s suggestions, in the case of education there will be training for collaboration across career tracks, in research broadly speaking there will be a need for interaction with more complex and varied levels of organization and concern, and in service there will be a need for researchers to engage actively with societal planning, collaborating across science, policy, and other stakeholder and expertise perspectives.

The National Council for Science and the Environment’s Center (NCSE) for Environmental Education Research surveyed the directors of sustainability related programs in US Higher Education, and found that one of the primary models of sustainability curriculum design, what Shirley et al. identified as “The Sustainability Solutions Emphasis Model,” emphasizes collaborative engagement, is most likely of all their curricular models to include an applied project component, and also places higher importance on the humanities than the other model discovered by the analysis.\textsuperscript{13} The collaborative skills required of sustainability science are likewise the skills required of active democratic participation. This is the proposed achievement of Dewey’s integration of vocational-technical and liberal content for democratic education.

\textsuperscript{12} Jantsch, “Inter-.”

\textsuperscript{13} Vincent et al., \textit{Interdisciplinary}, 23-24.
Collaboration as Democratic Process

In their now classic adaptation of Barber's *Strong Democracy* to the case of sustainability, Prugh et al. outline three practical reasons for a more engaged democratic politics as conducive to sustainable societies.\(^{14}\) The first is broadening the stakeholder base. This is needed because of indeterminacy, incommensurability, and the increasingly apparent effectiveness of local knowledge. The second practical reason is that collaborative adaptive management calls for an engaged citizenry, even if we have yet to come close to attaining this ideal. The third reason is that engaged citizens would become more aware and involved in the consequences of their choices as active participants, often referred to as “buy-in”. Following their basic thesis, the fact that scientific reductivism cannot overcome the inherent indeterminacy of social ecological systems means there is plenty of reasons to include other types of expertise, and other methods of knowledge production in conversations and decisions regarding the framing and answering of environmental questions.

Aligned with this call for a renewed democratic education that is capable of negotiating ecological challenges, sustainability educators today promote what can be understood as a civic science, preparing students for lifelong learning by doing, where citizens collectively grapple with the diverse and dynamic challenges associated with the development and maintenance of sustainable societies.\(^{15}\) As previous chapters have explained, communication skills and collaboration skills are key to the


\(^{15}\) Diduck, “Transformative.”
indeterminacy that is part and parcel of a pluralist society. Granted, course work on meteorology or quantum physics, for example, is equally important, and may well cultivate an appreciation for indeterminacy. But without communicative and collaborative practices that bring students to engage a diversity of peers and community stakeholders, which develop scientific sensibilities regarding indeterminacy and commitments to social justice, educators will not have well prepared students for their roles as responsible citizens, stewards, and innovators.

**Collaboration as Teamwork**

Identifying transdisciplinary collaboration in sustainability courses requires a shift from thinking in terms of traditional group work, where tasks are divvied up and there is little interaction between group members, to something more like teamwork, where the problem or situation requires integration of each member’s effort, and more intensive communication. Teams are defined as “a distinguishable set of two or more people who interact, dynamically, interdependently, and adaptively toward a common and valued goal/objective/mission.”\(^{16}\) Teams engage in both task work and teamwork. The tasks include everything members do to help their team achieve its objectives. Teamwork is “an adaptive, dynamic, and episodic process that encompasses the thoughts, feelings, and behaviors among team members while they interact toward a common goal” (Salas et al., 2014).\(^{17}\) Teams work because they can bring together complementary skills and


experience that exceed the ability of any one team member. The diverse abilities of a
team then allow for a range of possible responses to a scenario, improving overall
flexibility in the organization, which is a form of organizational resilience, so long as
groupthink is avoided. When teams interact, emergent motivations, affects, and values
develop, including trust, social identification, and shared mental models.18 The
emergent qualities of teams do not always unfold, but when they do it results in a
surprising degree of synergy and efficacy, which can be entirely game changing. This
synergy is rare, and researchers have had a hard time pinpointing its cause. The best
research has accomplished is identifying that successful teams have well developed
group norms, and a fairly equitable, if randomly disbursed, sharing of input.19

Successful teams generate positive feedback as they build social capital through
the experience, which can then be drawn upon for future challenges.20 There is no
single silver bullet model for successful teamwork, as the needs of the team will change
the approach that should be taken. And it is rarely the case that leadership alone
determines the success of a team effort.21 As humanity faces new more complicated
problems, it is wise to tap into the extensive unused resources that exist in the potential
teamwork of our existing organizations.


20 West, Effective.

21 Katzenbach, Wisdom.
But this is not to say that teamwork in this context requires all team members to be committed to a very specific and singular goal. Rather, transdisciplinary collaboration engages adaptive processes, and thus requires more extensive facilitation, communication and negotiation of all invested members of a given group or team. The spirit of collaboration, in the adaptive paradigm, involves the recognition of complexity, and thus, uncertainty, and so there is commitment to revisiting and amending plans and procedures based on unforeseen changes to the situation under examination. This, recall, was Dewey’s understanding of adaptation as a learning process and guiding principle for pragmatism. Dewey’s pragmatic sensibility led to a plan for the ongoing democratic renewal of a society enabled by an active and empowering education of individuals. The democratic education Dewey envisioned would accomplish an integration of the scientific and civic, the technical and liberal, so that science and technology could be put in the service of flourishing democratic societies. One of the primary sites for a scientific practice that is explicit in its formation of collaboration skills, existing at the nexus of science and citizenship, is the collection of strategies for increased public participation known as civic science or citizen science.


Collaboration as Civic Science

Citizen science is defined simply as “public participation in organized research efforts.” Put otherwise, it involves the utilization of non-scientists in scientific research. In the past twenty years the development of personal handheld computer devices and their increasing capacity for censoring and geographically pinpointing measurement data, along with the rise of the Internet as an accessible and effective way to aggregate big data, have increased the capacity and opportunity for everyday citizens to contribute to scientific projects.

Citizen science has been deployed in citizen observatories that work to monitor flood activities, animal observation and population estimates including birds, sharks, bats, eagles, marine spatial planning, as a means of engaging local stakeholders in policy making around conservation issues. As with other participatory strategies, there

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are obvious challenges to this approach, such as ensuring the validity of the data collected by non-experts and garnering enough public interest to make the endeavor a success. Nonetheless, researchers have confirmed that citizen science efforts can be successful and scientifically rigorous.

Citizen science works not only to help with monitoring of biodiversity through indicator species and related activities, but is also a process by which relationships are forged and reinforced that improve governance. As such, it has transformative social potential. There are at this point a great many examples of the professional context in which this form of adaptive collaboration occurs. Carol Colfer (2013), a team leader of major adaptive collaborative management (ACM) programs, documents The Center for International Forestry Research’s (CIFOR) 2-7 year projects at 30 sites in 11 different countries, beginning in 1998. The political implications, and the difficulties of achieving their goals, are summed up by Colfer: “The Board of Trustees and CIFOR administrators repeatedly asked, ‘how will you scale up from single cases?’ and said, ‘But your results won’t be generalizable.’ They worried that ‘CIFOR scientists are too expensive to focus on single villages. National research institutions should be doing this work.’ But most national forestry institutions had no social scientists, and foresters were typically working within bureaucratic, militaristic and technocratic frameworks (‘doxa’), uncongenial to the empowerment of rural peoples.” It is not realistic to suggest that only trained experts or well organized centers will be involved in the work to adapt to

29 Wehn et al., “Participation.”


climate change. As journalist Naomi Klein recently suggests with her book titled, “This Changes Everything,” there is ample evidence to suggest the need for a wholly new designed model for environmental management.\textsuperscript{32} Increasing stakeholder involvement can lead to participative inquiry, hence to participatory action research.\textsuperscript{33}

There are at least two approaches to this strategy. In the consultative model, scientists establish research questions and procedures and then engage citizens in the collection of data. In the transformative model, non-scientists are given a greater role in the discussions that lead up to the formation of new research questions, and efforts are made to include those not typically conservation-minded (e.g., programs that employ inner city youth in biodiversity measuring at local parklands) in the data collection process, so new relationships with nature, and functional understanding of the value of conservation can develop.\textsuperscript{34}

**Collaboration in Sustainability Programs and Syllabi**

National organizations recognize the need for both collaborative skill development and citizenship education in sustainability education.\textsuperscript{35} At the same time, collaborative skill development is not a panacea, and comes with risks. One interviewee worried that teachers sometimes assume that learning is an inevitable outcome of throwing students together into project work. Furthermore, this educator emphasized

\textsuperscript{32} Naomi Klein, *This Changes Everything: Capitalism vs. The Climate*, Reprint edition (Simon & Schuster, 2015).


\textsuperscript{34} Ibid.

\textsuperscript{35} Vincent et al., *Interdisciplinary.*
that important classroom based experiences were sometimes being neglected, as a result of the fad of experiential group learning. In that interviewee’s words:

“Whether it’s community engagement or hands on activities, we’ve done a lot on this campus to develop service learning and I’m not dismissive of the value of that stuff, but I do think there is a real danger in a lot of that stuff becoming a fairly shallow form of learning, as well as a fairly shallow form of service. They’re very time consuming. So, while they can have great value when done right, adding a bit to every course seems to me, poses the danger of not really learning much from the service learning component but also, taking time away from the reflection and analysis that a classroom at its best can provide.”

If endless technical information is presented without ample opportunity for reflection and meaningful connection with what has been learned, the subject is either quickly lost, or sorely misunderstood. If endless reflection on whole world views or ideological frames is not grounded in achievable goals and real world practice, opportunity is lost. This interviewee’s critical view of experiential learning is not easily dismissed. It rings especially true given the devaluation of the liberal arts in the “innovation economy.”

The data were analyzed to discover how collaboration skills were presented within sustainability degree programs descriptions. Within the sample of 82 degree programs, 35% explicitly mention student learning outcomes or course opportunities related to collaboration. Programs are likely to describe collaboration in reference to an important student experience within the program, and less likely to describe it as a general skill outcome. Collaborative experiences, such as group projects are described more often than explicit reference to the term collaborate or cooperate, or derivatives of

36 IL

37 Data search key: collaboration OR cooperate OR cooperates OR cooperation OR teamwork OR collaborate OR collaborates OR team OR teams OR group OR groups
these terms. Sustainability program descriptions include semester-long projects in which students organize around an issue or problem and develop a solutions-oriented project in reaction to the situation. Some program descriptions emphasized the fact that specific funding had been set aside to further empower undergraduates in these types of experiential, student-led learning opportunities:

The Group Study is a student-initiated, one-term project which provides an opportunity for collective pursuit of specific academic problems, topics, or issues which are not offered in the regular curriculum. A group study is intended to aid students in learning how to work cooperatively and effectively in a team. Key factors in the success of any student-designed study are planning, goal-setting, and evaluation. The content of group studies ranges widely. Some groups work on "hands-on" projects which have tangible products. Some groups are more seminar-like, with the objective being the sharing of information among members. Group studies are taken for credit/no credit only. First year students are not eligible. The group study administrator is required to submit an evaluation of each student to the registrar within three weeks after the end of the term. Participants decide how these evaluations will be done….Budget support is available from the College for expenditures such as travel and supplies necessary to the learning activity. The maximum award is $600

Program funded opportunities for undergraduate collaborative research are a bright sign in the search for transdisciplinary collaboration practice in higher education. Overall,

38 03 additional information of this program: The requirement that students describe these plans clearly in a proposal is intentional. In addition to review of the students planning, Academic Affairs Committee reviews the students’ proposal for its content and relationship to the rest of the curriculum. The deadlines for submission of group study proposals are published in the back of this catalog and online. A group study is approved in the term prior to when it will be done.

For a Group Study to be established the following requirements must be met:
-A minimum group size of five active participants. At least three of the five should share responsibility for the design of the group study and the preparation of the proposal.

-The proposal should: – contain a clear description of the educational goals and methods of the study – identify the tangible products – include a syllabus based upon a minimum of three hours of regularly scheduled meetings per week

- identify a faculty sponsor and any additional resource person – identify a student administrator – contain an itemized budget.
however, sustainability courses showed more evidence of collaborative practice than their associated program descriptions. While just a third of the programs make reference to collaboration, more than half of the syllabi include a collaborative component.

Figure 7-1. Types of Collaboration

Collaborative learning opportunities included courses where student groups put together a summary and presentation for the class. Each student has one part of the project, and each student is graded more or less independently. In this case each student takes a different part of the puzzle, which they can complete without much interaction with the other students, and there is little need for exchanging information or

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39 Students in groups of 3 will write a summary and present to the class (20 min. total) their analysis of a pressing environmental issue. Each student is responsible for presenting one aspect of the topic such as: 1) Historical background, 2) The science behind the issue, 3) Sustainability analysis, 4) Possible sustainable solutions, or 5) hypothesis and data collection, or 6) an illustrative prop/art piece. During the semester there will be due dates such as topic and team member list and list of sources to be used. Each student will be mainly assessed individually, but partially on integration with the final whole product. 05
strategies between students. In other instances, students are asked to integrate different knowledge types, to attempt to arrive at a wholly new and integrated understanding of a specific issue or problem. Interviews with educators suggest that students benefit from collaboration that requires they share the burden of framing research questions, and through structured opportunities to learn directly from one another. This learning can then be applied to solutions thinking for a given scenario. One of the more well-known activities of this sort is the Jigsaw:

For four of our class sessions we will be conducting “Jigsaws,” which are activities designed to promote collaborative learning and the sharing of multiple perspectives. At least two types of Jigsaws will be used: article-based and issue-based. For article-based Jigsaws, we will divide the class into 3 to 4 groups, with each group reading a different article. For issue-based Jigsaws, we will assign you a specific role to play in a controversy. To help you prepare for your role, we’ll require you to write a one-page memo (worth 15 points) that either summarizes the key points from your reading (article-based) or outlines the arguments you will use for your role (issue-based). You must build a case from your assigned perspective, even if it conflicts with your personal views. During class, you will first meet with an “expert group”, consisting of students that have read the same article or are playing the same role, and here you will develop and refine your arguments. Then you will meet with an “exchange group” consisting of one member from each of the expert groups, and there you will try to negotiate a resolution to the controversy. At the end of each class period, we will conduct a brief whole-class discussion of the controversy.40

The more integrative and interactive nature of the jigsaw reveals a more transdisciplinary pedagogy than the previous collaborative assignment, where students each had their own part, and were each graded individually.
Other transdisciplinary collaboration practices found in the syllabi data include opportunities for students to decide important structural components of the course, in the framing of the problem or situation to be researched, and even in the development of assessment procedures. In such cases students function not merely as a simulated polis, but a genuine public with a real decision to make, which will affect their entire (classroom) community. What makes this strategy transdisciplinary is a shift in the power dynamics in the room, so that the ideas and collective decision making power of the students is recognized and brought into the structure of the course. One syllabus specified this empowered role for students at the outset:

We will collaborate on specific expectations during the first week of class.\(^{41}\)

A slightly more simulation oriented version of the same approach gave students a chance to collaborate on a section of the course, with the idea it would potentially be implemented in the next iteration of the course:

In a group of four students, you will choose a topic that and design a section of the course (7 lectures) as though you were going to teach it to next year’s students. You will provide a brief outline of what the lectures will cover. Overall, the lectures must cover:

(i) The environmental components of the topic – why is this relevant for environmental sustainability – why is this an important issue from an environmental perspective?

(ii) The economic aspects of the problem. How can we use economic principles to either explain the problem and/or propose solutions to the problem?

(iii) The business components of the topic – in what ways does the issue pertain to how businesses are run and/or to the products they make or the processes they use to make products?

\(^{41}\) 33
(iv) Community development – how does community development relate to this topic. In what ways do our understanding of community dynamics and community development help us understand the causes of and solutions to this problem?

(v) International development – in what ways does this topic affect communities and individuals in societies in the developing world? Are there particular challenges faced by other countries in regards to this topic? How might this issue either facilitate or hinder “development” efforts? One member of each group will give a 90 second “elevator speech” description of your topic and course outline. This presentation will be graded from 1 - 10 points and the best presentation will win a prize.42

Classroom-level transdisciplinary collaboration occurs when students meet as a group to work on a project during class, but instead of this occurring once or twice, it is built into the weekly structure of the course, and the project is substantial enough to last a full semester. What makes this format transdisciplinary is not just that it provides students the opportunity to practice working with one another on a project, but the application of the transdisciplinary principle that student co-learning, via their own discussions, discoveries, and interests, is equally important alongside the sort of banking model education they might receive during a class lecture. It is an investment in time for the development of a community of learners. For example:

During the breakout session, you will be broken down into groups of 4 – 6 students to complete a semester-long group project. The Group Assignments are meant to help you complete your group project in manageable bits.

Such opportunities allow for the development of relationships, organized around specific issues or problem solving.

Most dramatically, the formation of communities of learners is supported through living learning model approaches to collaborative learning.
Living learning programs involve the inclusion of a housing component in the development of a learning community that supports group interaction and integration of academic and social experiences.\(^{43}\) Research has shown that living learning models result in improved self-reported learning for critical thinking, overall cognitive complexity, and appreciation for liberal learning.\(^{44}\) Appalachian State University, for example, has a living learning opportunity on their sustainability farm, including multiple farmhouses where students live while also working the farm.

**Farm Manager (FM):** A lot of them, apply to live at the farm, which is a whole difference situation, with no grades, it’s just work exchange, and as they’re working we’re all together.

**Tarrant:** What’s that like, managing all those work interns too. Do you feel like a teacher to them too?

**FM:** Definitely. It’s a class in all but the paperwork. And students can take part for two or three years. That’s a good long time to be involved. We’ve talked about making a class out of it. They would then be more accountable. Right now the accountability is just, if you don’ work enough, eventually you won’t be able to live here. That hasn’t really happened yet. Its crossed my mind a couple times but in the end I’ve found that those students come back and really give it a lot of effort in later semesters. You know they become part of the farm culture out there. It is its own subculture, they are out there living together, working together, and lot of the time they help me guide other students on the farm.

**Tarrant:** Do you think there’s consequences to the community they create there?

**FM:** There’s probably some social pressure if someone’s not lifting their share.

**Tarrant:** And do you think there’s benefits to the kind of relationship you can cultivate, there being no grades and it being a part of their day-to-day?

\(^{43}\) J Levine, ed., *Learning Communities* (Columbia, SC: University of South Carolina, 1999).

Often the interns are also in the class too. But even then it stays more casual since we already have that relationship, and they tend to come in with a leadership role already.

In another program, living learning opportunities focus on improvements to green building and power generation. For example:

Residents of the College’s E-house and other students explore, through practice, the relationship between their daily actions and the earth’s ecosystems. Several models of sustainability are discussed, and students are asked to articulate the view they believe appropriate for their own lives. Students cooperatively develop a significant improvement in the house or its grounds and monitor the environmental footprint of their actions.\(^45\)

Reflecting on the impact of these experiential living learning opportunities, one sustainability educator stressed the role of reflection alongside experiential learning, and expressed the difficulty of finding a balance between the two in conventional semester blocks:

The students that I’ve seen come through that program especially those that serve as co-directors (there’s three of them every year coordinating and living in the house), are in many ways some of the most energetic committed student leaders I’ve seen on any university campus. And before I did this I spent a number of years working in campus and student leadership issues. There’s no question that the students getting the in-depth experience like this, in a really in-depth meaningful way, more than I could provide in a few hours a week in the classroom. There’s an integral role for hands on learning, but also there’s an integral role for critical analysis and careful reading in the classroom. Both of these work best when there’s an adequate amount of time and attention put into them.\(^46\)

Living learning situations are transdisciplinary because of the diversity of tasks students face, and because of the high level of student-ownership and input into how the projects are conceived and executed. “Participation in and for sustainability is an important way
of recognizing the value and relevance of ‘local’ and ‘context-specific’ knowledge.”

Experiential learning is transdisciplinary when it includes in some fashion a political sensitivity to the source and means of knowledge production, and more specifically, for the inclusion of student feedback and input, even in the framing of learning goals. Living Learning opportunities do this by involving people in joint-analysis, planning, and control of local decisions.

Importantly, living learning in the context of sustainability is not a singularly scientific or liberal arts affair. Experiential learning that is transdisciplinary does not resemble an experiential form of classic vocational and technological training. John Dewey warned against such an error a hundred years ago, as people were first becoming infatuated with industrial, globally scaled technological development. Dewey’s warning went unheeded, and in many instances he was often interpreted as promoting the very sort of vocational, overly individualist education he meant to warn against.

Critical pedagogue Henry Giroux has well documented the resultant state of affairs:

Within the current educational reform movement, the logic of self-interest coupled with a rationality that frames knowledge and learning in technical terms has become the hallmark of defining the meaning of civic education in America. In this context, students learn little about the language of community and public association, how to create and affirm their own stories along with those of others who inhabit different cultural racial and social positions, or how to balance their own individualistic interests with those of the public good. Justice is outside the critical range of the new public philosophy and its attendant pedagogical formulations. In fact, the new public philosophy has little to do with civic education in the emancipatory sense of the practice; instead, under the rubric of character development in more regulation, it provides the basis for curricula and pedagogy but enshrines the virtues of possessive individualism, struggle

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47 Wals, Social Learning, 127.
for vantage, in the legitimation of forms of knowledge that restrict the possibility for political understanding and action.48

The dark situation described by Henry Giroux is not final. There exists a great opportunity for education to inspire students to develop both as individuals and as citizens of the world. Local institutional activism can draw previously uninvolved members into the community of political action, and can engage in processes of empowerment.49 Sustainability students tend to be most excited by the prospect of making real change beyond campus, and despite their hesitation to take on big challenges, and the limitations of the semester long time scale, students identify their work in the larger community as an impactful and empowering aspects of their formal education.50

Community-based collaborative learning often begins in the classroom:

Our farm-based work will begin Week 2 of our class.

Starting on Week 7, we will work side-by-side with local youth in a unique reciprocal learning opportunity. Participants in the program (14-21 age range) work as job trainees at the farm 9 hours/week during the school year and 20 hours/week during the summer. They acquire skills in urban agricultural production (composting, soil management, seedbed planning, hydroponics, organic pest management, harvesting, etc.) and economics (packaging, marketing, distribution, and sales).51

Or


50 As one student describes a transdisciplinary collaborative skills exercise: *We decided to go out there and talk to people and make the flyers, and we understood right away when we first made the flyer and handed it out the first time, okay we need to change this and make it better, and being out there, that was really the first time we felt our feet on the ground.*

51 22D
This semester, due to student interest we have two projects. The first is to write a class paper on an environmental threat facing citizens in *****. A grassroots group is trying to prevent a chicken processing plant from locating in their community. We will visit the community, speak with those involved in the issue and write papers on the issue. The first weekend of the class (January 31-February 2) we will take a mandatory class field trip to *****. The paper for this project should be completed by the end of February. However, we will discuss this as a group. The second, and more time-consuming project, will be to develop an environmental education curriculum for the *****Center for *****.52

Transdisciplinary collaborative problem solving carries over into community-based learning through extended internships:

One year of cooperative education is required. Students may begin their first co-op in the spring of their third year. Co-op provides students with the opportunity to apply their skills in multiple, real-world situations before they graduate. Co-op students are especially valuable to organizations because they are well-qualified and well-prepared to take on the many interesting environmental projects organizations have difficulty completing without additional staff. Co-ops range from field research to office work, and employers range from government to industry.53

This can also occur in an entirely online course, where each student is linked with a community partner via email, and they conduct applied and transdisciplinary research for that stakeholder under the guidance of the course instructor, and through peer feedback in the online classroom, focusing on decision-making and practice in environmental and sustainability fields. In the classroom, online, or in field-based internships, students are able to connect with communities and organizations to identify information needs, select appropriate methodology, collect and interpret data, and develop suitable research reports.54

52 21A
53 58
54 32
The next section presents more detailed descriptions of two transdisciplinary collaborative learning opportunities, derived from interviews with sustainability educators.

**Science, the Liberal Arts, and Transdisciplinary Collaborative Learning**

This section documents two cases; one from an environmental humanities course and one involving a social science class. Both cases are highly experiential, and combine work with community members from beyond campus with environmental health and social justice concerns. The first case illustrates the use of assigned literature and detailed student reflection activities to draw out the meaning of experiential collaborative activities. The second case exemplifies the emergent learning potential of experiential opportunities that also provide significant time for discussion and reflection. In other words, it is the open-endedness of experiential collaborative learning that often creates a space for especially educational interactions. Both cases have achieved a balance between scientific-vocational content and liberal content, much as Dewey envisioned.\(^{55}\) They are presented as examples of transdisciplinary collaboration practice, in the spirit of Deweyan democratic education.

The first case concerns the Wings of Hope program, a service learning program at Florida Gulf Coast University, where college students in the humanities collaborate to produce and present environmental science curricula concerning local habitats and ecosystems with 4\(^{th}\) and 5\(^{th}\) grade students. The program has won The Campus Compact Florida Award, The Green Schools Alliance Award, and its founder Ricky Pires

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\(^{55}\) Refer to the discussion in the introductory chapter, concerning Dewey’s Democratic Faith and Education
was recently honored as one of Florida’s Women Who Make Southwest Florida. This interview was conducted with Eric Otto, a professor who teaches in Wings of Hope:\footnote{Both Dr. Otto and Dr. Holland agreed to having their identities and the identity of the program revealed within the dissertation.}

Otto: Basically it’s an environmental education program where my students are trained to deliver an environmental education curriculum to fourth and fifth graders, and that curriculum revolves around the Florida panther, and the students, fourth and fifth graders in the fall semester come to campus, we have this really great panther room and the director of the program brings the students in, and then my students work with them.

The Wings of Hope program is very science based so it seems at first out of place with what I’m doing in the humanities, but I’ve worked closely with the director of that program to incorporate that science-based curriculum with a humanities based curriculum and the way I do that is through the idea of a sense of wonder.

This allows me to reflect on the importance of the facts, and also to reflect and think about a more humanities-type concept, ‘sense of wonder’. Whether you read about it in literature or you’re asking people to describe their feelings when they had it, it’s really hard to put your sense of wonder in words, it’s a very grounded experience. We often use the word “something”. I don’t know there was just “something” about it, you know. And so I really try to emphasize that we are delivering this to students in the science-based program, and how can we talk about it from more of a humanities-science based perspective.

What happens basically is a 35 student course, six of them, a group of say five to seven students will miss class on any given day to be doing the Wings of Hope. In the spring they actually go out to a nature preserve and teach the kids out there, how to use a GPS or an anemometer. Before I’d made the humanities connection I felt like it was defeating the purpose of what I was trying to do in the course and with the directors of Wings of Hope. We wanted to create a rounder understanding of the way that we approach environment in today’s world. It has to be scientific and it has to be from more humanistic perspectives. Or else, we’re not going to get a full sense of how to communicate these issues.

So dealing with the Florida panther, there’s all kinds of humanities based ways of looking at it, from a creative perspective. There’s science fiction, thinking about the future, and framing our look into the future through the lens of what we’re currently doing in the environment. There’s a collection of short stories by Paolo Bacigalupi, and about half the stories in this
collection are environmental based.\textsuperscript{57} They read the stories the first time through the lens of an actually existing environmental issue; GMO’s, endangered species. There’s a story about water scarcity, and the social and political and economic implications of water scarcity, again, all creatively rendered because it is creative work that we’re reading, but it ties back in. So when we are discussing those stories the students have done their research for Wings of Hope. They understand that there are issues locally regarding the extinction of species, regarding water, and so you can make those issues really direct. But it’s all doing it through storytelling; they’re reading fiction, and they’re able to connect the reality of these environmental issues as being articulated through some sort of fictional narrative, which in my opinion is the high point of doing work in the humanities, especially in interpreting creative work, it’s really being able to connect it to something meaningful in your own experience.

To prepare students for experiential learning, appropriate literature, especially case studies and autobiographies, can be utilized as an initial, \textit{virtual} form of experience. Literature and storytelling are primary ways people learn from the experience of others. Also, key to the Wings of Hope program is an emphasis on creating a community of learners. The interviewee suggested that the best way to do this was to have the entire class engaged in the same experience, which allowed for deeper shared reflections.\textsuperscript{58} Just as the creative teamwork literature suggests a strategic combination of individual creativity and structured sharing, the Wings of Hope program is working to cultivate service learning experiences that can then be reflected upon.


\textsuperscript{58} We are moving more toward course-based service learning so we still have a balance of faculty that tell their students to go out and find an environmental problem and contribute to its solution in some way, but more and more, the trend here is to do something together as a class to make it more meaningful, something you can actually incorporate into a class discussion, in terms of the issues and interests students might have. It allows for deeper reflections I think when everybody is doing the same projects.
individually, and also discussed as a group. Dr. Otto made a point of talking about reflection as an integral part of the service learning experience.

It’s not saying that service learning doesn’t have its intellectual component as well. All professors who teach service learning courses are encouraged to have their students do reflections, because it’s that reflective piece where the meaning really happens. Of course the action of going out and doing something is the meaningful part, but then actually getting students to sit down and write a paper about what they did, why its meaningful, that type of thing, is what’s especially interesting to me.

In terms of what it actually looks like – if you have the students going out and doing a project, and it becomes something they have to do as an institutional requirement, and they go out and clean the nature trail and they get their 10 hours; that’s a small part of the challenge for the teacher, even if that is what’s most obviously required for the course, but then getting them to reflect on it critically…. To me I think that reflection would be putting what they are doing into a larger framework, to show that its meaningful, or maybe even that its meaningless (laughing), depending on the experience.

Reflection is a key component of any well-developed sustainability learning program. Individually, this is the case because a student’s personal method of learning has to be questioned and tried, and routines have to be examined. In group contexts, reflecting on collaboration leads to identifying possible solutions which could take new, as yet, untried directions, and helps students remain open and develop the needed empathy for group success.

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60 For acquiring key competencies for sustainability, the ability to reflect on one’s actions is seen to be a crucial pre-requisite Rychen, 2003

Reflection on the meaning of collaborative experiences is itself often a collaborative endeavor. Collaborative reflection or meaning making occurs through mapping activities. Such was the case in the second case study. Like the Wings of Hope program, the Asthma and Air Pollution Monitoring project is ongoing and involves a tiered mentoring scenario. In this case college students and middle school students collaborate to measure air quality in the city, and discover the safest walking routes for school children. Nationally, about 8% of the student population is asthmatic; in the community where this project occurs 24% of the student population is asthmatic. The interviewee acknowledged that conducting elaborate collaborative projects across age ranges can be very difficult and time consuming. Her solution involved some creative reworking of conventional social science course scheduling, including credit for a social science lab, and granting students absences from class so they could participate in the community project.

Teacher: What I do in the environmental policy air monitoring lab is I give them two weeks of class off. So I eliminate four classes. In this course I normally taught, domestic policy, and at the end of it we go into local planning issues, and I eliminated the local planning issues and turned that into the lab. Cause when you are out there learning about air pollution, you’re learning about why you don’t have laws at the local level that are stronger, why the poorest are dealing with highest exposures to air pollution, and you’re learning about asking questions about how new laws might be made, so they are getting some stuff that’s relevant to planning.


63 Related experiential air quality projects in this program can be found here: https://lehightountaintop.wordpress.com/2014/07/03/tackling-indoor-air-pollution/

64 The course does include conventional content: “They had to give a presentation that counted for fifteen percent of their grade at the end, the whole thing, and then, they still have to do an argumentative five-page paper, and they take a midterm and a final. The midterm is identification of terms and an essay. They still had to be accountable to the reading.”
This is something that takes at least an amount of time equivalent to a science lab, and you teach these once a week, over the course of the semester and so my solution is they start creating social scientists who are doing these kinds of things, like natural scientists, so if you have a two-two load, and you're running a lab, you get to do a two-one load, which is what they do for the natural scientists.

I split them into four groups of six, so twenty-four students. My classes sometimes get bigger but I limit it to this when I do that lab... I have to coordinate with the middle school teacher doing the science and engineering class and what I normally do is they gather the data together and then the students take the monitors back to the lab and they download and manipulate the data and then we teach them (middle schoolers) how to graph it. The students work with their same group of middle schoolers and teach them how to do all of this. So they have a visual representation of what they created themselves, of what they did, and the best way to get home. Its a lot of work though because you're coordinating and moving kids around, there's a lot of moving targets, you have to make sure everyone is monitoring at the same time, dealing with the technology is challenging, you have to do it at times when students are available,

I've done a lot of these labs. Recently I wrote a grant to get another monitor. To get the grant I added in a pre and post testing of knowledge, so the first day of class the college students took a questionnaire regarding their knowledge on air quality then at the end of the semester I gave them the other one to demonstrate how they did, and of course they learned so much. It's a really effective way to teach them. Cause air quality is very technical information. So it's both making it real because you're seeing it on the screen, you're explaining it to kids, you're out there measuring stuff you can't see. It really brings it to life for them, and i think it helps them remember the micrograms of particulate in the air (laughing).

I would say the most interesting of all the discussions that emerged were when we were mapping the routes home from school. So we created these huge color maps of the city of and we brought them into the eighth grade science and engineering class and then we broke them all up into groups. So, what the high school students had to do was take one color of pen and they mapped their usual route home, and then their next task was, if they were on a high exposure route, something that was near the traffic, then their task was to identify an alternative route. So my students were supposed to work with the middle schoolers to figure out a low exposure route home, and of course the most frequent thing that came up was they couldn't, or wouldn't walk on the low exposure routes.

My students would ask them, "well why can't you go this way," and they would say "My mom won't let me go this way, she only wants me to walk
on the trafficked roads.” Well why do they only want them to walk on the traffic roads, they're worried, their parents are worried about safety issues. They think if there's a lot of people around it's going to be more safe. They were worried about gangs in the neighborhood. These were really particular views that were enlightening to my students. So i think there was a huge amount of reflection on that in my class. It was even surprising for me to hear that because we don't see the gangs. For middle schoolers to have that knowledge and concern about it, coming from their parents. So they learn in that respect. The students who are developing ongoing relationships with kids from the community, like the ones from the boys and girls club, they become very social justice oriented very early.65

The Wings of Hope and Air Pollution and Monitoring projects are indicative of the largely possibilities of Dewey’s vision of infusing scientific learning with liberal education. It is a case of the humanities and the sciences integrated to address specific, locally relevant problems, where students are still responsible for the book learning, for the basic content, and for any required technical knowledge, but all of this conventional course material is made relevant, meaningful, and practically useful by allowing students time to practice and engage with what they’ve learned in the local community. Finally, back in the classroom, students reflect on the value, challenges, and opportunities of the work, again, utilizing literature that helps broaden their perception of the scope of their actions, and additional group discussions.

As the teamwork literature suggests, the synergy of teamwork is a connection between the individual and the group, so with experiential learning, it is a synergy

65 The interviewee had more to say regarding the role of these types of courses in building community and respect for other people as well: “They become, they see and they want to protect the kids. I find this fascinating because we had the worst time in this community garden, keeping it from being vandalized, its a very busy corner, until we started working with boys and girls club in there, and then everyone in the community became so protective over it, over these kids, you know that was their stuff in the garden so they wanted to make sure nobody was taking anything out of it. The homeless people in the community started self-policing the garden. And then, what's interesting about that is that started changing the relationships between the highschool students and the homeless people, suddenly they were all hanging out, making sure the kids community garden was protected. That kind of stuff had a pretty profound impact on them.”
between the outward relation, and the inward relation, such that meaning occurs both through persistence and through reflection. This is to go from a relation to a relationship.

The processes of meaning-making through relation and reflection occurs between learner and environment, between learner and other learners, and between learner and technique. It is likely there are other sources of this meaning generating experience as well. The key is the quality of the interaction, and the quality of the reflection that connects the interaction with past and future. In other words, to harken back to the theoretical basis of this section of the dissertation, it comes down to something like Dewey’s experiential learning framework of continuity and interaction.

**Conclusion**

Since its incorporation into world conservation strategies in the 1980s, the adaptive collaborative management approach has in many instances failed to achieve its goals. Failed attempts are often linked with efforts that ensured the participation of local stakeholders but did not recognize the importance of learning in collaboration.  

Practitioners in the field have adapted their approach to participation with local communities to better reflect the pedagogical necessities of an empowering collaborative endeavor:

Because of the way local communities were engaged in resource management in the past, they felt disempowered and lacked confidence to participate in the joint resource management project. To build their confidence and also encourage them to effectively participate, the ACM team decided to conduct Training for Transformation (TforT), an empowerment training. The team got the idea of the T-for-T workshop from its use by the Intermediate Technology Group (ITDG) in Chivi Ward 21 in Zimbabwe. In Chivi, ITDG discovered that T-for-T resulted in farmers demanding changes in the approach and attitudes of extension workers. It also stimulated farmers to carry out their own experiments as a means to

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66 Ojha, *Adaptive*. 
solve their own problems. It also led to greater democratization of leadership and more transparent decision-making. T-forT draws to some extent on Paolo Freire’s *Pedagogy of the Oppressed*. T-forT emphasizes experiential learning, empowerment of local people to control their own destiny through active participation in their development, and the sharing of ideas and knowledge.\(^{67}\)

Transdisciplinary learning is about sharing power and expanding the bounds of what counts as adequate knowledge. Following the research that has been done confirming the methods of collaborative empowerment in international development, sustainability degree programs that incorporate experiential learning can promote increased self-learning and time on task, and increased collaboration within the student community of learners, focused upon the projects and problems they identify.

While getting students into the community and establishing the requisite relationships with community members so collaboration is possible requires a great deal of work and long term commitment from educators, transdisciplinary collaborative learning can occur in the classroom as well, often with less energy invested. As the evidence reviewed in this chapter suggests, students can collaborate with one another to design a section of the course (not just a ten minute presentation) and students can work together as an entire class to develop rigorous assessment mechanisms that are more effectively grounded in their actual experiences. When students develop these metrics themselves, they are more invested in the assessment experience, and tend to spend more time preparing, collaborating in preparation for the exam, and producing more extensive final answers.\(^{68}\)


\(^{68}\) This conclusion is derived anecdotally from the last three years of action research and the inclusion of student generated assessments in a portion of the courses. The student generation of assessments
The framework of critical systems thinking and transdisciplinary communication and collaboration skills comes together in the achievement of experiential learning opportunities directed at real public problems and that incorporate a range of knowledge types and a range of actors. Sustainability courses bring scientific and social learning together to address the major issues of the 21st century. Dewey anticipated the kind of education that would be required of a complex and globalized world. In 1939 he saw that the “period of free lands that seemed boundless in extent has vanished. Unused resources are now human rather than material.”69 Dewey’s solution was not just more democracy, but a more creative democracy, willing to integrate more and more varied types of knowledge, willing to explore and experiment across spheres of interest. “To cooperate,” he wrote,” by giving differences a chance to show themselves because of the belief that the expression of difference is not only a right of the other persons but is a means of enriching one’s own life-experience, is inherent in the democratic personal way of life.”70 Dewey saw experiential education that accommodates citizenship and individual development, and major tenets of sustainability, such as interdependence, uncertainty, experimentalism, and democratic pluralism.71 Indeed, Dewey went a long way to integrating these distinct commitments into a single public philosophy. Dewey also identified the ethical implications for this shift in public orientation to what were

occurs with guidance, of course - typically the assessment questions they derive go back and forth between student and instructor at least a few times.


70 Ibid, 228

71 For more on this see Tarrant and Thiele, “Practice Makes Pedagogy.”
obviously social situations. The pedagogical implications of Dewey’s public philosophy include the notion that personal development requires social practice, and collaborative success occurs through the efforts and interactions of strong and capable individuals. As to which comes first, social practice or a capable individual – Dewey’s answer is neither; what comes first is situation; and what shapes situation is environment.

Collaborative learning is about doing things in context, and it is this negotiation of contexts that constitutes a significant portion of what is practiced, and hopefully learned. The context of a given situation can be understood in terms of a broad understanding of environment. The experiential emphasis on learning environments is made political through transdisciplinary practice. Transdisciplinary education, most basically, is based upon the inclusion and creation of knowledge not typically recognized by the ivory tower, alongside more traditional forms. At the same time, the potential of the liberal arts to participate in the achievement of transdisciplinary and experiential learning opportunities depends partially upon interactions with the institutional and cultural structures that might support or suppress its practice. Educators interested in engaging

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72 He writes, “If men had been educated to think about broader humane values the way they have now learned to think about matters which fall within the scope of technical arts, our whole present situation would be very different. The attention which has gone to achieving a purely theoretical certainty with respect to them would have been devoted to perfecting the arts by which they are to be judged and striven for... Suppose also men had been systematically educated to believe that the important thing is not to get themselves personally “right” in relation to the antecedent author or guarantor of these values, but to form their judgments and carry on their activity on the basis of the public, objective and shared consequences.” Dewey “Philosophy’s Search for the Immutable,” in The Later Works of John Dewey, Volume 4, 1925 - 1953: 1929: The Quest for Certainty (SIU Press, 2008), 37.

73 “In actual experience, there is never any such isolated singular object or event; an object or event is always a special part, phase, or aspect, of an environing experienced world - a situation.” Dewey, Logic, 72.

their students with more empowering learning opportunities often come up against the institutional constraints of a system that does not yet recognize the full value of inter- and transdisciplinary learning. As social scientists Robert Bellah has explained, “in our life with other people we are engaged continuously through our words and actions in the creation and re-creation of the institutions that make our life possible.”75 This and other avenues for future research are presented in the concluding chapter.

CHAPTER 8
SUMMARY AND FINAL REMARKS

Introduction

I set out to explore the rapid development of sustainability education initiatives in American universities and colleges, and specifically to understand the extent to which sustainability education might be understood as a 21st century, ecologically informed version of Deweyan citizenship education.1 In so doing I worked to contribute to an understanding of skills-based learning and citizenship education in sustainability degree programs. The primary research questions guiding the dissertation were:

- What is the prevalence and character of skills-based sustainability education?
- Does skills based sustainability education, to the extent it is occurring, constitute a form of citizenship education?
- Is such an education aligned with liberal democratic commitments to autonomy and empowerment, as they are conceived in the foundational work of democratic pedagogue and philosopher John Dewey?
- Is such an education aligned with the experiential learning pedagogy developed by John Dewey?
- In what ways does such an education differ from the original vision of democratic education described by Dewey?2

The research was conducted as a work of phronetic social science, focusing on exploration, description, and practical application of findings.3 Following the methodological arguments of Girt Biesta, the research sought not to explain, but to

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1 Dewey’s project for democratic education can be read across a number of his works. The dissertation primarily utilized Dewey’s The Democratic Faith and Education (1944); “Evolution and Ethics” (1898), Democracy and Education (1916), The Public and Its Problems (1927), The Quest for Certainty (1929), Experience and Education (1938), and Freedom and Culture (1939), and Logic: Theory of Inquiry (1938).

2 In the spirit of action research, alongside the primary research questions listed above, I was driven by the potential utility of my study for educators in the field.

3 Flyvbjerg Making; Flyvbjerg et al, Real.
explore. Sustainability education is a relatively new and quickly changing movement in American Higher Education. The project required the collection and creation of a first of its kind dataset of sustainability syllabi, program descriptions, educator interviews, and student-generated data.

The analysis and results, discussed in the next section, identified an emergent form of Deweyan democratic citizenship education within sustainability education program offerings, specifically with regard to skills development in critical systems thinking and transdisciplinary communication and collaboration. Suggested implications of the research included the possibility of a renewed civic mission for liberal arts programs in American higher education. Taken as a whole, the dissertation embodies the Deweyan spirit of adaptive learning and practical inquiry. Themes of critical analysis, improved communication, and the formation of communities of learning weave through the chapters, and these threads of Deweyan democratic education were synthesized with the latest developments in sustainability education. The mixed methods employed and the combination of theoretical and empirical work enabled a novel and productive methodological strategy for a study of dynamic social phenomena while maintaining a sensitivity to the political implications of the practice under study.

**Empirical Findings**

Part 2 of the dissertation explored the prevalence and characteristics of critical systems thinking, which is a common component of sustainability education learning

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4 Biesta and Burbules *Pragmatism*; Biesta *Good*; Osberg and Biesta *Complexity*
frameworks.\textsuperscript{5} The analysis of journals found that critical thinking is a common skillset in sustainability education, and systems thinking is an \textit{increasingly} common skillset in sustainability education. In sustainability program descriptions these same skills are found, and they are found in syllabi, both listed as learning outcomes, and recognizable in a range of experiential learning activities. Regarding critical thinking, 21\% of syllabi explicitly reference the term, and 70\% of syllabi referenced a related term.\textsuperscript{6} Regarding systems thinking, 13\% of syllabi explicitly reference the term, and 63\% reference a related term for systems thinking.

One example of systems thinking integration in sustainability education is the food energy water nexus, discussed in chapter 4. While all the components of the nexus were found to be common in the syllabi, it was less common to find a course or program that integrated all three aspects of the nexus, or made reference to the nexus specifically. Critical systems thinking in sustainability syllabi was explored by way of applying Gert Biesta’s framework for learning outcomes based on \textit{qualification}, \textit{socialization}, and \textit{subjectification} to an analysis of learning outcomes in courses that included a systems thinking or related reference. It was found that the most common learning outcome in systems-inclusive courses are \textit{qualification} type statements. \textit{Subjectification} type learning outcomes were then broke down based on the type of interaction with identity formation, world views, and related content. It was found that most \textit{subjectification} references were soft, which is to say, they did not impose a


\textsuperscript{6} See chapter 4 for an explanation of the related terms.
worldview or ideology upon the student; rather, they suggested the importance of considering multiple perspectives or the importance of diversity of opinion or a related, pluralist spirit for communication and inclusivity as a part of democratic knowledge formation.

These findings suggest, in partial answer to the 3rd research question, that critical systems thinking is primarily about building skills, not worldviews, and where it does engage with subjectification, it does this primarily in the spirit of democratic pluralism. Thus, it was found that sustainability education’s emphasis on critical systems thinking, at least as it is understood in learning outcomes, is well aligned with the normative commitment to the autonomous learner that is associated with liberal democracies.

Furthermore, this learning outcome data was explored for the type of course and type of program in which different learning outcome categories occurred. It was found that subjectification learning outcomes occurred primarily in courses that did not have a great emphasis on exams, which suggests a correlation between subjectification and liberal arts and non-technical courses. This finding was further confirmed based on the result that subjectification occurred primarily in overview, economic and social courses, whereas qualification (technical skill) occurred primarily in environmental (natural science) courses.

Lastly it was discovered that bachelor of arts degree programs were more likely to include all three learning outcome types than bachelor of science programs. And within the bachelor of arts programs that included all three learning outcomes, courses from liberal arts colleges were more likely to have all three learning outcome types than
research universities. Implications for the continued role of the liberal arts, and the challenges of integrating scientific and liberal content were discussed.

Part 3 of the dissertation examined the prevalence and characteristics of transdisciplinary communicate and collaboration in the syllabi, program descriptions, and educator interviews. A review of primary journals found that the term “transdisciplinary” does not often occur as the title of an article, though it is prevalent in the journal literature. It was also found that the term transdisciplinary typically occurred alongside the term systems, slightly less alongside the term “communication,” and less still alongside the term “collaboration.” Within the sustainability syllabi, 33% contained explicit communication skills activities. Of these courses, there was a fairly even distribution of those that did and did not include transdisciplinary forms of communication skills building. Freire's banking model of education was applied to better distinguish between transdisciplinary and non-transdisciplinary skills practice. It was discovered that even within communication-specific courses, listening is an undervalued skill. Results of a qualitative analysis of student blogs were presented, suggesting that more transdisciplinary blog pedagogy empowers students to frame their own discussions, and results in increased time on task, word counts, and variety in the discussion. It was found that only 25% of syllabi included a reflection activity, and only

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7 Defined in brief as “different academic disciplines working jointly with practitioners to solve a real-world problem” (Klein 2001). It is discussed in greater detail in chapters 5 and 6.

8 Transdisciplinarity, communication and collaboration skills are all prevalent in the bulk of literature on frameworks for sustainability education, as discussed in chapter 1:

9 Freire Pedagogy of the Oppressed.
10% included journaling specifically, which a number of educators had identified as helpful, during the interviews.

An analysis of the co-occurrence of science and communication was run, and it was discovered that communication and science commonly co-occur within degree program descriptions, but rarely do so at the level of specific courses. In other words, it is likely much easier to design a program that includes a course in biology and a course in communications or debate, than it is to include within a single course, these disparate activities. The data were analyzed to discover what kinds of courses include a transdisciplinary communications component, and it was discovered that scientific and technologically-oriented courses were more inclined to non-transdisciplinary pedagogy, whereas civic and career oriented courses were more inclined to include transdisciplinary communication practice. These findings were confirmed in a content analysis of *The Handbook of Transdisciplinary Research*, which includes considerable reference to systems and science, but nearly no reference to communication. Thus, while transdisciplinary research and learning are dependent upon advanced communication skills, there is little evidence of this connection being made in course design, as of yet. Implications were discussed for these findings, regarding the possibility of an adapted form of Dewey’s democratic education in sustainability education, given that Dewey’s vision is based on an emphatic need to combine learning types and experiences, so that the best of science can inform and be informed by the best in classic liberal learning.\(^{10}\)

\(^{10}\) Dewey explains most explicitly in *The Democratic Faith and Education* (1944), discussed in chapter 1 of the dissertation.
Chapter 7 examined the prevalence and characteristics of transdisciplinary collaboration skills practice in sustainability degree programs, and included extended excerpts from two interviews with educators. Within the program descriptions, 35% mention student learning outcomes and opportunities related to collaboration. Within the syllabi, 58% reference collaboration. A range of collaboration activities and assignments are listed in chapter 7, along with their frequency relative to other collaborative activities and assignments. Transdisciplinary collaborative skills practices were reviewed with an emphasis on student ownership, service learning, and living learning programs. Lastly, in partial response to the findings from chapter 6, two case studies, one from an environmental humanities course and one from a social science/policy course, were reviewed for their degree of integrated scientific and liberal content, their inclusion of service, and the role of reflection within those courses. The cases are presented as further evidence of the practical possibility of achieving Deweyan democratic education in an ecologically informed age.

In summary, the dissertation identified an emergent form of Deweyan democratic citizenship education within sustainability education program offerings, specifically with regard to skills development in critical systems thinking and transdisciplinary communication and collaboration. It did this through theoretical alignment of Deweyan democratic education with skills based sustainability education. Dewey’s specific vision of integrating technical and vocational learning with liberal learning was found to be a characteristic component of sustainability education program design, and to be much less common within specific courses. Integration of learning types within sustainability degree programs appears to occur primarily by offering students courses in science,
and other courses in the liberal arts. The integration of these learning types does not often occur within individual courses. This existent level of integration may or may not adequately prepare scientists and citizens for the extent of transdisciplinary and adaptive learning practices that will likely characterize their professional lives.

In some cases, sustainability education does present a strong worldview and does suggest that students adopt it, or risk a devastating future. But this is not a common characteristic of sustainability education. Syllabi typically stress pluralism and diversity, and leave it to the student to decide on the specific changes to be made, and toward what ultimate ends. While the method employed does not allow for a strong conclusion regarding exactly how much an open, critical form of systems thinking occurs in these classes, the method deployed does make a strong descriptive case for a liberally relevant form of critical systems thinking, suggesting Dewey’s vision of integrated learning infused with democratic spirit is manifest in such courses. The question of liberal education was explored further with recourse to environmental political theory. Dewey’s concepts of continuity and interaction were applied to a description of education that empowers students as autonomous agents. Reflection was highlighted as a key component of empowering education. Autonomy was described as relational autonomy.

As a whole, the research suggests that a commitment to sustainability, the inclusion of sustainability readings, and experiential learning pedagogy do not on their own achieve an education practice that is aligned with Dewey’s vision of empowered democratic citizenry. However, there is evidence that a version of sustainability education, emphasizing critical systems thinking and transdisciplinary communication
and collaboration, is achieving the kind of practice that Dewey described. These courses achieve a form of citizenship education, sharing a common skill set, sharing a commitment to active citizenship, respect for differences of opinion, and willingness to work peaceably toward sustainable solution. Dewey’s democratic education anticipated the need for a strong technical and scientific background, but he also saw the need for skills practice in communication and social cooperation, arguing that only then would the potential of science and technology be fully applied to the public good. Sustainability introduces environmental issues to the sphere of civics education, but it doesn’t only do this. It also introduces systems thinking, adaptive learning, and adaptive co-management of public goods to the sphere of civics education. At the same time, civics education has itself been adapted over the last twenty years to include interdisciplinary applications of civic education in courses not traditionally associated with civics.11 To the extent liberal arts educators can embrace the new learning skills of the 21st century without losing their core commitments to critical thinking and personal expression, they are poised to prepare students critically, creatively and collaboratively to grapple with the pressing environmental and social challenges of our time.

**Limitations of the Research**

The dissertation offered an extensive description of the practical and theoretical components of contemporary sustainability education practice, but it in no way achieved definitive conclusions regarding exactly how sustainability education should be taught, or which practices are essential to sustainability education. The dissertation instead applied a Deweyan framework of democratic education to the occurrence of skills-based

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11 Musil “Educating”; Musil, “CIVIC Prompts.”
education in sustainability degree programs, and described an emergent form of citizenship education. The dissertation did not offer an explicit critique of sustainability, though it did critically examine a variety of approaches to skills education in sustainability classrooms, and suggested varied levels of alignment with liberal democratic autonomy.

The dissertation cannot claim that syllabi or program descriptions are wholly illustrative of classroom practice, though it does assert that syllabi and program descriptions are among the most relevant and telling forms of data for the analysis of sustainability education practice, and it supported its use of this material through triangulation with other data types, and verifiability checks involving other sustainability data sets. The dissertation does not achieve a systematic exploration of all of the components of the framework of critical systems thinking and transdisciplinary communication and collaboration. Given the immensity of the data, constraints to the breadth of the analysis were necessary. The resultant data set provides more opportunities, however. For example, it was in my opinion especially unfortunate that the dissertation was not able to include an analysis of the creative process in sustainability education, especially as it is integrated in some cases with solutionary systems thinking. The description of empowerment as well as the theoretical consideration of autonomy would have both benefited from a closer look at creativity and how it empowers individuals to engage in creative collaborations for sustainability.

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12 See chapter 2 for the verifiability mechanisms that were used.

There exist a great many more opportunities to utilize the data and contribute further to the collective understanding of sustainability education. A range of these future possibilities are explored below.

**Recommendations for Future Research**

The research produced many more questions than it answered. The research involved an extensive data set, which offered many possible directions for analysis. Furthermore, many findings began to emerge only near the end of the analysis, and were not able to be fully fleshed out in the current project. A number of possibilities exist which define my research agenda going forward.

As an action researcher, I was teaching courses in sustainability during the bulk of data collection and during analysis. I became aware, through this combined experiential practice and process of action research, of the limitations to American higher education’s semester system, its disciplinary structures, and its grading norms. At the same time, a great many of the open ended interviews included reflections from educators on the challenges they faced in their institutions. Future research into sustainability education can look specifically at these institutional challenges, identifying leverage points for institutional change, and also collecting creative strategies for working within the existent system.\(^{14}\)

Relatedly, work could be done to better organize the range of experiential and transdisciplinary learning strategies employed in the syllabi that were reviewed. A

searchable database, oriented to sustainability skills and also searchable by course subject and assigned readings, would be a helpful toolkit for educators, and could be provided freely and openly through a searchable web database. A proof of concept website, utilizing the syllabi and coding scheme generated during the research, was designed in Spring 2016. The next stage of this project is to contact all the educators and secure permission for the anonymous publishing of their syllabi in the data set, for the common good. Hopefully this will occur with the help of undergraduate researchers in Fall 2016.

Sustainability deals with a number of very depressing facts regarding the loss of species, the level of public indifference and ignorance regarding these issues, the nearly unfathomable scale of climate change. Thus there is ample opportunity for students to become overwhelmed, to feel disempowered, and to succumb to fatalism. Paul Loeb has written about the energetic tax of inaction.\(^\text{15}\) A number of interviews with sustainability educators mentioned the role of positive attitude, how important it was that their students held on to a sense of hopefulness given the seriousness of the issues associated with sustainability.\(^\text{16}\) Further research into sustainability education can explore empowerment in education according to the social-emotional intelligence it affords its students, and how this contributes to their overall demeanor and sense of agency.\(^\text{17}\)

\(^{15}\) Loeb, *Soul of a Citizen.*

\(^{16}\) A recent special edition of a journal was on hope, and the Association for Environmental Studies and Sciences conference had multiple panels on the issue at its 2015 conference.

Lastly, while there is significant evidence of empowering skills practice in sustainability education in American higher education, there are a number of non-formal education movements in America that embody the same transdisciplinary, experiential spirit, the same democratic sensibilities, and a strong systems-orientation to the issues. The primitive skills movement is one primary example of this kind of non-formal education, as well as increasing certification in permaculture and permaculture design. Further research into sustainability education could run a similar analysis of skills and empowering practices in the non-formal sustainability education community, and interview students and practitioners from these various movements. It is likely that formal and non-formal educators for sustainability have much to learn from each other, and that there exists a great potential for collaboration across these spheres of learning.

**Concluding Thoughts**

In summary, the dissertation describes a viable political and institutional context for the manifestation of democratic education in an ecologically informed age. The research has contributed to the understanding of skills-based sustainability education and the practice of these skills in the classroom. The challenges of sustainability education are many, and the exploratory nature of this research has, true to its form, discovered more questions than answers. The challenges of transdisciplinary curricula and programming can be better addressed when there is some clarity regarding the type of education that such programming and course design might achieve. This dissertation has offered one such vision, incorporating ecological and environmental sciences, new systems-based approaches to critical thinking, and the political sensitivity that accompanies transdisciplinary pedagogical practice, into Dewey’s vision for democratic education. It offers this description up as a potential source of renewal for
the civic mission of the liberal arts, and its ongoing commitment to educating citizens for flourishing liberal democratic societies. I am at the conclusion of this research in awe of the complexity of a process as vast as the reformation of the higher education system in response to the pressing challenges of the 21st century. I am also all the more committed and enthusiastic regarding the possibilities of that process.
LIST OF REFERENCES


Conole, Grainne, Galley, Rebecca, and Culver, Juliette. “Frameworks for Understanding the Nature of Interactions, Networking, and Community in a Social Networking Site for Academic Practice.” *The International Review of Research in Open and Distance Learning* 12, no. 3 (2011).


Flick, Uwe. *An Introduction to Qualitative Research*. SAGE, 2009.


Winant, Gabriel. “Grad Students to the Barricades.” *Dissent*, Fall 2012.


BIOGRAPHICAL SKETCH

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