

How Matching Systems Thinking with Critical Pedagogy May Help Resist the Industrialization of Sustainability Education

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Abstract: This theoretical and conceptual article explores the connection between systems design in education, specifically curriculum design, and critical pedagogy, the educational adaptation of critical theory. The author presents the well-established concept of how the industrial standardization of education stems from the imposing of linear structures onto curricular design, inherently suppressing students and communities to have greater control on their educational experience. While there have been great gains in sustainability education, it is self-defeating to the systems thinking nature of sustainability to have sustainability instruction follow traditional linear formats. The author discusses some essential concepts to systems thinking and systems design, and then explores many of the preeminent authors of critical pedagogy and their respective viewpoints. In the discussion, the author interweaves how a systems approach to curriculum design can help meet calls made by critical pedagogy theorists, possibly alleviating some of the oppressive curricular norms assumed by industrialized linear education.

Keywords: Systems Thinking, Curriculum Design, Critical Pedagogy, Sustainability Education

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Introduction

The establishment and perpetuation of a linear, industrial design for education—well-argued to have co-opted modern public education near the start of the 20th century—has entrenched the United States into an antiquated and ethnocentric education system. Based on *The Principles of Scientific Management* by engineer Fredrick Taylor (1911), state governments, as encouraged by the federal government, catered to a growing industry demand for human resources by intentionally designing curriculum and instruction to prepare and later extract workers for the Industrial Revolution rather than develop an informed citizenry (Dewey 1916, 1938; Tyack, 1974; Ackoff & Greenberg, 2008). Later exacerbated by the culture of consumption fostered post-World War II to bolster the economy (Leonard, 2010), this industrial occupation of educational design persists through the prominence of high-throughput, linear efficiencies in schools and teacher preparation programs, making the introduction and integration of sustainability education into traditional public education systems a challenge.

Reinforced by Enlightenment ideals of reason and driven by the scientific method, the scientific principles of management reinforced the Cartesian method of reductionism by simplifying the needs, tasks and expected outcomes of preparing industrial workers. In this effort, instruction of knowledge content was broken down into smallest parts possible to understand completely and make learning as efficient as possible in hopes of making manufacturing as efficient as possible for capitalistic benefit. In turn, the severances of relationships in an attempt to better understand ideas and concepts in singularity inherently compromised student's ability to assess the complexity of the world around them. Rather than approach problems with a lens of holism and foster expectations and appreciation of emergence (later described), it was more economically advantageous to prepare people with linear instruction that reinforced an “if this, then that” expectation of work and the world around them.

The original design of industrialized education was very effective at achieving its goal of producing competent workers for manufacturing and mass industry, which essentially led to the quality of life that many of us still benefit from in the developed world. However, to have a high volume of skilled workers tailored to meet industry demand, much like mass-producing products, educational design demanded a regimented and assimilatory approach to instruction, regarding students like the products being manufactured. Akin to the conveyor belts that dominated the floors of industry, a singular, rigid path of instructional content and method was often the only path offered to students, regardless of their cultural background, educational needs or aspirations.

As society has shifted to and from entire economic eras (e.g. Information, Network, Knowledge) and now the burgeoning Circular Economy (Ellen MacArthur Foundation, 2013), education has been slow to shift with it, leading to numerous challenges in how and what we prepare people for. This has created a mismatch of our learned approach to economic activity and how ecosystems operate. Sustainability education has taken heed of this mismatch (and partially arisen from it) to find an equilibrium where we sustain a co-existence between humans and nature. For as innovative, creative and engaging as sustainability education can be, particularly its content, much of its instructional structure still follows industrial design (see Figure 1) that dominates most education settings. With so much emphasis placed on systems thinking and innovation in sustainability education, why is sustainability still often taught in a linear, industrial format?

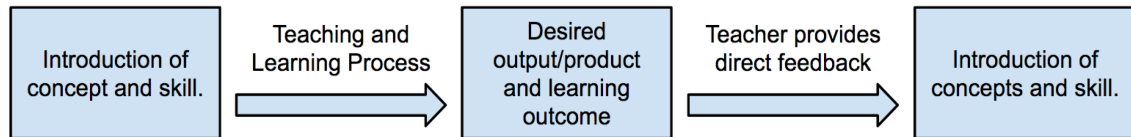


Figure 1. Linear model of industrial education design (Bernier, 2017, p. 2).

This paper explores that mismatch and dives into the field of critical pedagogy, examining its roots and calls against injustices in the education system, particularly in design. In the discussion, references made to a “systems curriculum” allude to the author’s openly accessible research (Bernier, 2015), exploring how adopting systems thinking dynamics to inform sustainability educational design can help empower those often subjected to educational inefficiencies and injustices perpetuated by antiquated linear design lingering in modern education. The choice was intentionally made to not include research specifics here, but rather focus on the conceptual integration of systems thinking and critical pedagogy.

Linear and Industrial Education

Education has changed over the last century in many ways (e.g. standards, assessment methods, technology integration, content, etc.), but it still fundamentally works in the industrial model, particularly in the United States compulsory public school system. In David B. Tyack’s *The One Best System: A History of American Urban Education*, he writes that education in the 19th century was largely decentralized. Control over curriculum and teaching methods was largely left to local communities to fit the needs of village’s rural work and social/religious cultures (Tyack, 1975). But as industrial growth and urbanization accelerated toward the end of the century, these schools collapsed to the demands of reformists who sought systemic efficiencies and scientific methods to inform educational design.

Bowman and Hamer expand on Tyack’s analysis, noting that “social efficiency proponents erased individual and community traditions in their desire to standardize – supposedly to equalize-educational opportunity” (Bowman & Hamer, 2011, p.5). This leads to the additional argument that this centralization of education was also meant to “tackle the urban immigrant “problem”” (p.5) for the large number of immigrants that were arriving at the end of the century. Bowman and Hamer write that most immigrant groups, Native Americans and poor whites of the south and rural communities “learned through formal schooling to be ashamed of their differences ...and deficiencies...that reinforced social stratification (p.5).

Quickly after this systemic reform, a countering democratic-progressive educational movement emerged, often noted with reformists such as John Dewey, Helen Parkhurst and Maria Montessori. Their philosophies and efforts to increase community engagement and heighten student autonomy in formal education (e.g. schools, academies) still echo today, but lag compared to their influence in nonformal (e.g. community groups, religious associations) and informal education settings (e.g. interactions with family, peers) (p.4). Currently, almost 50 million students—the overwhelming majority of students in the United States—are taught in formal K-12 public schools. There is a comparatively small but growing number of private and charter schools experimenting with curriculum design to empower their students with sustainability principles, and charter school enrollment has nearly tripled over the last decade (NCES, 2017, p.93). Yet, these institutions serve only about 16% of the U.S. K-12 population. Even so, most of those charter and private schools follow an industrial model of instruction and further, there is ongoing debate as to whether charters select and segregate student populations to

bolster performance outcomes (Fox & Buchanan, 2017), further perpetuating social stratification.

While states and the federal government have debated adopting more rigorous Common Core standards in preference to state standards, they are still focused on rudimentary tasks or basic abilities to articulate what students learn, continuing industrial design. Few standards (albeit more in Common Core (Cheuk, T., 2012)) stress complex critical thinking or call for students to demonstrate holistic problem solving, skills that Ackoff and Greenberg (2008) called “absolute necessities” as we have left the industrial era behind and continue past the age of information into the age of knowledge. So long as students “pass the test”—often a multiple choice test—as far as the state is concerned, they are ready for the next grade.

There is plenty of evidence that this problem extends into higher education. David Orr (2011) argued that in opposition to the breadth of complexity that systems and ecosystems command, the liberal arts education is preparing students in anything but. This means a traditional liberal arts education meant to emphasize multidisciplinary learning is still focused on specialization and narrow instruction (Orr, 2011, p. 169). With that, Orr argued liberal arts have been “largely divorced of practical competence” and “ecological design arts in the liberal arts means bringing practical experience back into the curriculum in carefully conceived ways” (p. 170). A systems orientation to curriculum may be one of those carefully conceived ways.

Peter Senge identifies the main reason why preparing students in an industrial model for an industrial economy that no longer exists is a problem. He states, “the Industrial Age has often been called the ‘machine age’ before the rise of machines and the way they operated transformed the way people thought and worked. It wasn’t long before people were expected to work like machines and the assembly line became the icon of efficiency and standardization for all organization” (Senge, Smith, Kruschwitz, Laur & Schley, 2008, p. 11).

Dilafruz Williams and Jonathan Brown in *Learning Gardens and Sustainability Education: Bringing Life to Schools and Schools to Life* (2012) remind us that not only has curriculum been closely tied to linear, industrial constructs but the built environment that surrounds our students also mimic this mindset. Where factories have often been large, four-walled enclosures with little connection to the outside, schools for most of the last century followed the same model. Williams and Brown write, “the physical structure of the building is interrelated to an overall educational paradigm, transmitting a hidden curriculum that often ignores life and is disconnected from the surrounding community” (Williams & Brown, 2012, p. 16). However, this vis-à-vis mode of industrial education has been counteracted with a movement to replace pavement, concrete, and lawn with living gardens not only to introduce students to living systems, but to begin breaking down the artificial physical structures that often separate students from the natural world (p. 16).

Williams and Brown write that linear education fosters a *decontextualization of learning*. With physical infrastructure that not only separates students from the natural world, students are taught that curricular subjects appear in isolation; this is known as a “siloization” of education (2012, p. 6). This perpetuates the idea that knowledge and life happen in isolation, deconstructing students’ ability to develop relationship-based understanding between subjects, or even recognize that someone outside of the classroom who is not a credentialed teacher, such as an elder or member of a different cultural community group, can still be approached and regarded as a source of general knowledge, let alone sustainability knowledge.

Emerging Systems in Education

Opposite of the linear construct in industrial education, systems structures are based on

multiple diverse relationships connecting parts of an entity with a driven purpose (Meadows, 2001). Systems range anywhere from simple systems with few parts and known outcomes (such as simple machines), complicated systems with many parts also with known outcomes (e.g. cars, computers), to complex systems that can self-organize and adapt, where outcomes and behaviors are not known for sure, what is often referred to as emergence (such as a colony of ants organizing or the economy shifting or even children playing) (Mitchell, 2009, p.13). Systems science and thinking is not new, reaching back into the 1950s as its own discipline in dominant culture (Forrester, 2010), and in use for thousands of years by indigenous cultures, often referred to as ‘traditional ecological knowledge’ that acknowledges the “understanding that indigenous peoples have on ecosystems and their interconnectedness (Edwards, A. 2010, p.7). As sustainability and systems thinking have become more closely linked, Andrew Hoffman and John Ehrenfeld argue that in the continuous evolution from regulation to environmentalism to sustainability, we have now reached a “fourth wave,” where sustainability is now giving way to systems thinking (Hoffman & Ehrenfeld, 2014). While they focus on how smarter business and management structure shifts toward systems thinking, it is important to heed Hoffman & Ehrenfeld that a systems approach will be integral to design and innovation in developing sustainability solutions.

When looking at issues and possible solutions, we often find a large network of interacting parts and a series of actions and consequences affecting a greater whole, much like the parts of a car or the organs of a body. But by teaching in a linear style, moving from objective to objective and consequently thinking in a singular direction, it’s harder to draw bigger connections and focus is drawn to a reductionist examination of parts. This compromises critical and systems thinking, both essential to teaching and learning sustainability. Senge in *The Necessary Revolution* states:

A sustainable world will only be possible by thinking differently. With nature and not machines as their inspiration, today’s innovators are showing how to create a different future by learning how to see the larger systems of which they are a part. (Senge, et al. 2008, p. 10)

This idea of learning how to see the larger systems of which we are a part alludes to the idea that we are entrenched in embedded systems. In systems dynamics, systems are often nestled into one another through a hierarchy. The highest order system in the hierarchy contains subsystems, each of which contains its own set of subsystems and so on (Golley, 1998, p. 20). This can be analogized to students as well, as what makes a student unique and unable to conform to a set curriculum is that the student belongs to different systems in their life and operates differently within those systems. At a larger scale, a student can or does belong to a family system, peer system, school system, extracurricular system, and community system. On a more internal level with an educational context, students operate differently with homework systems, discipline systems, test systems, and instructional systems, all of which have their own component parts and relationships.

Systems and embedded systems typically work together to maintain a balance of operation. These balances, which Meadows (2008) noted as negative feedback loops, are achieved through constraints and inputs. The change needed for the education system, as educator Sir Ken Robinson (2012) said, requires a departure from the linear mindset, as no social change is linear. You can plan industrial processes that are linear. You can plan chemical and inert process that are linear. But as soon as you get feelings involved, as soon as you get people involved, as soon as you engage the culture, as soon as you

involve aspirations and hopes and anxieties and uncertainties and different ways of seeing the world, as soon as you are talking about social change, it's never linear, never.

(Robinson, 2012, 12:02)

So while Robinson argues you can plan for linear, can you design and plan for systemic unknowns (emergence) that allows a student's individual needs? Sustainability education theorist Stephen Sterling (2001) noted that traditional curriculum tends to be focused on outcomes, which often rigidifies instructional processes to ensure we achieve those outcomes. He wrote that design and aspirations tend to be organic, participative, open, iterative and evolving.

From the current situation of over planning, and too much top-down control—which leads to rigidity and inability to respond to change—we need to move towards a “sustainable design” of education. (Sterling, S., 2001, p. 80)

In sustainability education, some of the intended outcomes may be unclear or poorly understood by curriculum designers. Sterling pointed out that “it is difficult to design for sustainable education if we have little idea of current progress towards making a more sustainable society” (p. 79). However, regardless of the desired outcome, central to sustainability curriculum is the premise of change. Sterling argued that to foster this change, “considered at any level of educational systems, there are two key principles:

1. The process of change influences the products of change.
2. Emergent properties cannot be predicted but can be designed for.” (p. 80)

Healthy and resilient systems can serve as the design model to facilitate change and adaptation, especially with the continuous evolution in the complexity of sustainability problems and solutions. Systems theorist Fritjof Capra (2002) in *The Hidden Connections* wrote “understanding human organizations in terms of living systems, i.e., in terms of complex non-linear networks, is likely to lead to new insights into the nature of complexity, and thus help with the complexities of today's business environment” (p. 100). So while designing for business, education or any human construct, moving away from traditional linear education may allow for new innovation. Sustainability education pays attention to these complex interconnected relationships, examining ecosystems, economic systems, and social constructs to then understand how a system's function allows for effective problem solving and development toward resilient systems. When an outside disturbance affects a system, the diversity of components can offer a greater amount of abilities to resist it, fostering a more resilient system better apt to resist that disturbance or recover from it (Walker & Salt, 2006, p.2). When assessing society and constructs within it, such as education, we should maintain this diverse approach of systems thinking as we hope to create resilient students.

While we must continue deconstructing physical walls and surfaces to help our students reconnect with the natural world, the next section examines the call of critical pedagogical theorists and how a systems approach to education will help the deconstruction of reductionist thinking and fostering a student's liberation from industrialized education.

A Systems Approach to Critical Pedagogy

As referred to earlier, democratic-progressive voices emerged in response to the industrialization of education at the turn of the 19th century, notably John Dewey's strong critiques and advocacy of democratization in education early in the 20th Century, such as this excerpt from his book *The School and Society*:

The (social) change that comes first to mind, the one that overshadows *and even controls all others*, is the industrial one, the application of science resulting in the great inventions

that have utilized the forces of nature on a vast and inexpensive scale: the growth of a world-wide market as the object of production, of vast manufacturing centers to supply this market, of cheap and rapid means of communication and distribution between all its parts... One can hardly believe there has been a revolution in all history so rapid, so extensive, so complete... *That this revolution should not affect education in other than formal and superficial fashion is inconceivable...* (Dewey, 1900, p. 21-22)

Observations and sentiments like this gave rise to further a collective movement called critical pedagogy, an intellectual and social justice effort to move education away from rigid standardization (Kincheloe & Steinburg, 1997, p. 24). It combines education with critical theory, a neo-Marxist philosophy rooted in the idea of identifying and reflecting upon the ideologies and systems that entrap people. It also aims to identify how obstacles to achieve liberation from oppression embedded in social systems can be removed (Horkheimer, 1982, p. 244).

In his foundational book *Pedagogy of the Oppressed* (1970), Paulo Freire described how the traditional structure of education fundamentally limits and oppresses learners in it, and how educators, knowingly or unknowingly, assume the role of the oppressor as designed by established pedagogy (Freire, 1970, Chapter 1). Freire then coined “the banking model” of education to represent how typical education works. Students are treated merely as empty containers, like an empty bank, whose purpose is to be “filled” with information wanted by the educators and administrators (Freire, 1970, Chapter 2). While education assumes a singular, linear path of information with an exhaustive top-down approach to instruction, Freire argued there must be a balance of input from both the learner and the teacher. When learners are treated as “co-creators” and the system is dependent on mutual input for success, not merely when students are *allowed* to contribute, then education no longer oppresses the learner.

Ira Shor, friend of Freire, stressed that as opposed to merely learning for the sake of learning, both educators and students need to realize the responsibility that comes with their learning, particularly in the light of social change (Reilly, 2013, pp. 114-115). The stress on disrupting the status quo, as taken from Freire, is that to merely continue traditional learning is to perpetuate injustice (p. 115). In Shor’s *Empowering Education: Critical Teaching for Social Change* (1992), he noted that educators and students need to “go beneath surface level meaning ... to understand the deep meaning and root causes ... of any action, event, process, etc.” (Shor, 1992, p. 129). This call for deeper understanding is where a systems approach to education shifts focus on relationships and causation of concepts, not of ideas in isolation. Since understanding of relationships between concepts is at the core of a systems-designed curriculum (Bernier, 2015), it forces the student and the educator to dive deeper into the meaning of concepts, since there are multiple ways to approach an idea, giving the leverage of adaptability to both the learner and the educator.

How Traditional Education Allows for Oppression

The diversification of critical pedagogy has grown rapidly with the changing landscape of social culture and education’s stagnation. When designing curriculum, Henry Giroux argued “student’s lived experiences [is] the defining feature with respect to a curriculum that embraces a critical perspective” (Barto & Whatley Bedford, 2013, p. 62). What Giroux argued is that many modern youths are experiencing their lives through digital and shared media, and that modern schooling is failing to address that. He noted:

contemporary youth do not simply rely on the culture of the book to construct and affirm their identities; instead, they are faced with the daunting task of negotiating their way

through a de-centered, media-based cultural landscape no longer caught in the grip of either a technology of print or closed narrative structures. I do not believe that educators and other cultural workers can critically understand and engage the shifting attitudes, representations, and desires of new generations strictly within the dominant disciplinary configurations of knowledge and practice and traditional forms of pedagogy. (Giroux, 2004, p. 68)

The ability to have student-centric, adaptive use of multimedia platforms to express learning, conjoined to written and traditional text-learning methods, is central to a systems curriculum as signaling and information processing is identified as a property of complex systems (Mitchell, 2009, p.12-13). Not only does this simply keep up with the changing landscape of how information is processed, but it also gives students the ability to share their learning with the public, such as blogs, digital portfolios and social media (Bernier, 2015).

However, Giroux noted that continued resistance to media and technology integration further perpetuates injustice, as “unfortunately, the tide of learning experiences, especially for minority and low-income students, has dramatically shifted, so that today’s classrooms are steeped in authoritative and compliance curriculum structures, measured by discriminatory testing measurements” (Barto & Whatley Bedford, 2013, p. 62).

In her book, *Teaching to Transgress: Education as the Practice of Freedom* (1994), author and activist bell hooks argues that the profession of teaching is deteriorating and education is facing a crisis in which “students often do not want to learn and teachers do not want to teach” (hooks, 1994, p. 11). This may perhaps be why we have increased challenges in teacher retention and student drop-outs, where teaching and learning are exhausted by “confining each pupil to a rote, assembly-line approach to learning” (p. 18) and subjecting them to the authoritative and compliance curriculums described by Giroux (2004). Even in her own educational experiences, hooks found that Freire’s “banking model” was quite prevalent and often gave unequal advantage to white males, who have traditionally benefited the most from industrial, linear education (hooks, 1994, p. 4).

However, hooks emphasized that regardless of where the conversation of education and cultural reform may be, that “the classroom remains the most radical space of possibility in the academy” (p. 11). It is for this reason that the development of curriculum, where direct instruction is cultivated, holds incredible power to achieve sustainability literacy and can empower teachers and learners to make the needed changes across education. hooks noted that to see education as the mechanism to overcome oppressive powers that be is to “celebrate teaching that enables transgressions—a movement against and beyond boundaries” (p. 11).

While hooks decried that much of modern education perpetuates elements of racism, classism, and the marginalization of minorities and the poor, she noted that if done right at the right time, it may be the only mechanism to liberate groups who have been historically suppressed, especially economically. I personally have often debated with myself and others when would be the appropriate age to introduce the systems curriculum to students, but after reviewing hooks’ work *Where We Stand: Class Matters* (2000), I conclude that it would appear preferable to do so sooner rather than later, as “without education for critical consciousness that begins when children are entering the world of consumer capitalism, there will never be a set of basic values that can ward off the politics of predatory greed” (hooks, 2000, p. 88).

The authoritative curriculum structure Giroux (2004) mentioned that follows a linear, top-down flow of energy, coupled with the marginalization of class structure hooks and Freire discussed, follows the oppressive nature that Marxist humanism addresses. The theory of Marxist

humanism focuses on Karl Marx's early writings regarding how class stratification essentially alienates people for the benefit of capitalism. The theory argues that capital cannot exist without labor, and as supported by Tyack and Bowman & Hamer, it is in the capitalist's best interest to maintain class structure to ensure labor from lower classes (Smith & Rodriguez, 2013, p. 104).

Marxist humanism, along with the writings of Freire, is at the root of author Peter McLaren's (1999, 2002) work, "engaging Marxist humanism as a means of analysis considering the interrelations of transitional neoliberal capitalism, public education, and the exploitation of the worldwide masses" (McLaren, 2002, p. 104). One of McLaren's key writings is his book, *Life in Schools: An Introduction to Critical Pedagogy in the Foundations of Education* (2002), where he criticized nearly all segments of education: politics, culture, and economics. McLaren maintained when applying critical theory to education, "critical theorists begin with the premise that men and women are essentially unfree and inhabit a world rife with contradictions and asymmetries of power and privilege" (McLaren, 2002, p. 193).

McLaren's strong critique of modern industrial education decries what has become of both the student and the teacher. He wrote "by defining academic success almost exclusively in terms of creating compliant, productive, and patriotic workers, the new conservative agenda for a 'resurgent America' dodges any concern for nurturing critical and committed citizens" (2002, p. 187). Some may see this as harsh, but the root of a systems curriculum is commitment to the development of sustainability "change agents," who must be "critical and committed" citizens, and linear curriculums are not doing this. McLaren argued that many curriculums adopted by states are "teacher-proof": they essentially deskill teachers and "reduce their roles to that of a semiskilled, low-paid clerk" (p. 187). I do not inherently agree new curriculums have completely eliminated teacher input into the classroom; the Common Core and Next Generation Science Standards many states have adopted allow and encourage teacher development of instruction. Still, it is yet to be seen if these new standards will make schools "sites for social transformation and emancipation, places where students are educated not only to be critical thinkers, but also to view the world as a place where their actions might make a difference" (p. 187).

In *Schooling as a Ritual Performance: Towards a Political Economy of Educational Symbols and Gestures* (1999), McLaren describes the teacher as a "liminal servant," a suitable role for the teacher facilitating a systems curriculum. McLaren described the liminal servant in several ways, including as one who "is able to bring dimensions of liminality to the classroom setting where obligations that go with one's social status and immediate role are held temporarily in abeyance" (McLaren, 1999, p. 115). He further argued that with this approach, "an added vitality is brought to the rites of instruction ... from within the confines of social structures to the seedbeds of creativity located within the antistructure" (p. 115). As sometimes the relationships that connect elements within a system can be ambiguous and require both the teacher and the student to go beyond the facts taught in class, the liminal servant teacher needs to facilitate the student's attempts and ability to bridge together two concepts that may not have appeared connected before. This takes creativity and excellent teachers must have this skill.

Systems Design in Education for Economic Success

In the landmark book from the mid-1970's, *Schooling in Capitalist America: Educational Reform and the Contradictions of Economic Life*, economists Samuel Bowles and Herbert Gintis (2002, 2011) originally offered a strong critique of capitalism's influence on the structure of education. Through subsequent editions of the original text, Bowles and Gintis have consistently maintained that "schools prepare people for adult work rules by socializing people to function

well and without complaint in the hierarchical structure of the modern corporation” (Bowles & Gintis, 2002, p. 1). They called this concept the *correspondence principle*, where schools are engaged in “structuring social interactions and individual rewards to replicate the environment of the workplace” (p. 1).

In the 40 years that *Schooling...* has been in existence, Gintis and Bowles have maintained that not only is the correspondence principle still prevalent in schools but, based on their studies, some long-standing beliefs of education actually have very little binding relationship to the outcome of a student. For instance, Bowles and Gintis wrote “the educational system fosters and reinforces *the belief* that economic success depends essentially on the possession of technical and cognitive skills” (Bowles & Gintis, 2011, p. 103). However, they called into question what students derive from education, claiming “the intellectual abilities developed or certified in school make little casual contribution to getting ahead economically” (p. 110). If anything, the attainment of degrees and grades, an extrinsic value of learning, rather than the actual use and refinement of the intellectual skills and abilities, or intrinsic values of learning, can often guide economic success based on the current educational structure.

Essentially, Gintis and Bowles argued that a person’s economic success or depression is determined as much by their life outside of school as inside it: that “[I]n the United States, knowing the income or wealth of someone’s parents is about as informative about the person’s own economic status as is knowing the person’s years of schooling attained or score on a standardized cognitive test” (Bowles & Gintis, 2002, p. 3). In other words, if someone is coming from poverty, the chance that their academic attainment will vastly improve their economic quality of life will be much less than those who are coming from a higher class. This is because the educational structure inherently reinforces social class, which comes from a system wrought with contradicting forces. As Bowles and Gintis observed, “the educational system’s goal of integrating youth into adult society will conflict with its role in promoting equality and full human development” (Bowles & Gintis, 2011, p. 101) as employers and social elites continue using education to assign individuals to economic positions. Simultaneously, “parents, students, worker organizations, blacks, ethnic minorities, women, and others have sought to use schools for their own objectives: material security, culture, a more just distribution of economic reward, and a path of personal development conducive not to profits but to a fuller, happier life” (p. 101).

Systems Design for Multicultural Education

Professors James Banks and Geneva Gay have long advocated that multiculturalism must be included in teaching and learning design in order to achieve the social justice called for in critical pedagogy. Not long after the release of Freire’s *Pedagogy of the Oppressed*, Banks (1974) published “*Curriculum Models for an Open Society*.” In it, he wrote that “curriculum is normative since it is designed to create and sustain a specific set of beliefs, attitudes and institutions” (Banks, 1974, p. 43), which in an open society means “individuals from diverse ethnic, cultural, and social class groups have equal opportunities to participate” (p. 43).

Banks argued that in all of human history, including the founding of the United States, formation of norms and beliefs is dictated by the ruling few, a concept that persists. According to Banks, these few, most often of White, Anglo-Saxon heritage, inherently deny others access to participation in the *open society* to maintain the power they have (1974, p. 44). There is a distinct relevance here for a systems curriculum, as linear instruction still helps industries continuing to operate in archaic industrial models, but disserves students who, when they leave school, are often limited by a lack of adoptability in their skillsets needed to succeed in a much less

industrial society. An *open society*, as Banks said, allows a person to obtain rewards and opportunities based on his or her knowledge and skills, not from even distribution from or at the discretion of more powerful classes or groups, to “contribute to the fulfillment of the needs of his society” (p. 43). A systems model inherently draws upon the prior understanding and individual skills (cultural and intellectual) of the student to succeed.

Just as Banks argued that the inherent design behind curriculum is often driven by the interests of those in power, influences on those who directly teach and interpret curriculum are just as important. Geneva Gay (2010) developed the approach of culturally responsive teaching, described in her book of the same name. She writes that expectations teachers develop can often be rooted in factors that have “no basis in fact” and can even stand contrary to evidence (p. 64). These expectations can even be further exacerbated by the teacher’s response to elements of race, class, ethnicity, gender, and culture, especially if they are in contrast to the teacher and/or school. Gay also noted that teachers often interact and communicate differently with different groups, typically allowing for more intellectual and rigorous connection to European American males than other groups, who receive less of those types of interactions and more disciplinarian and lower rigor interactions (p. 66).

One of the most blatant efforts to erode cultural identity also started in the late 19th century in Indian boarding schools. Through the forceful assimilation of Native American youth in formalized, anglo-saxon style academies, generations of indigenous youth in the United States were subjected to the same streamlined, controlled, linear education with the added emphasis of wiping away cultures that were deemed an affront to industrialization and urbanization. There are now efforts to preserve native culture, language and practices, but we are only two generations removed from the ending of boarding schools, and it is well recognized that deep emotional and cultural trauma still haunts indigenous groups (Easley & Kanqlak, 2005; Hirshberg & Sharp, 2005).

While not as outwardly egregious, Prakash and Esteva (2008) write that this erosion is still happening across the world, just masked in the claims and promises of prosperity from formal education. One concrete example they present that exemplifies this is language. In reference to a dying indigenous language (Mocho), and subsequently entire culture (Motozintleco), in southern Mexico, the loss of Mocho “is the story of what happens when the children of a community, pursuing promises of education, systematically forget languages of their commons and their communities (Prakash & Esteva, 2008, p.8). Further, Prakash and Esteva write that even multicultural education, such as the aforementioned efforts to preserve indigenous culture, only encourage people to “learn about history, language and culture while at the same time shaping up for being shipped out into the international economy, learning to clamber higher on the career ladder designed for the educationally able and competent; for those who want to do well in the One World, the Global Village” (p.8).

A systems driven curriculum should enable students to actively articulate, defend, and show their learning both inside and outside of the classroom as systems are often dependent on multiple points of material and information input and output. A student’s own culture and norms should be invited as part of the assessment process with a given chance to explain how it relates to curricular topics, not merely fitting it into an assignment left to the sole judgment of the instructor, typically acting in isolation. The process of evaluation should encourage dialogue and immediate feedback, which may open the door to start breaking down preconceived notions of students that teachers often develop based on cultural stigmatizations. As Banks later wrote in *Educating Citizens in a Multicultural Society* (2007), by overcoming these cultural stigmas and

embracing the strengths of cultural character, educators will empower students to become citizens of their communities, nations, and world. As Banks wrote, “to prepare effective citizens for living in a democratic society, schools themselves must become democratic institutions that model caring, ethnic diversity, and effective citizen action” (Banks, 2007, p. 7).

Systems Design for Democratic Schooling

Emergence in systems is well stated by Aristotle’s “the whole is greater than the sum of its parts,” where the unique and unknown behavior of complex systems exists only when certain parts are connected in some way, not merely existing in isolation or suppressed. Perhaps then it is this idea of empowering students, teachers, and schools *as a whole* to have greater voice and input on educational experiences that is central to the demand for increased autonomy and choice of learning, which not only a systems curriculum should strive for, but also would be at the heart of democratic schools. Much like how every vote is equal in a democratic society, Michael Apple wrote extensively on the aim of growing the democratization of schools and the educational process. In *Values and Politics in the Curriculum* (1998), he and Landon E. Beyer wrote, “meaningful curriculum reform must occur from within those institutions, and by those people, most intimately connected to the lives of students ... whose work in schools aids the process of genuinely transforming educational practice (Beyer & Apple, 1998, pp. 6-7).

Apple and Beane (2007) argued learners should have as much power determining what needs to be learned as those in power as “a democratic curriculum invites young people to shed the passive role of knowledge consumers and assume the active role of ‘meaning makers’” (Apple, & Beane, 2007, p. 17). A systems curriculum (Bernier, 2015) allows students to be assessed on how well they connect ideas and competencies, and as opposed to reciting facts and traditional concepts, it encourages their own “meaning making” and crafting their own conceptual understanding. This forwards Beane’s and Apple’s premise that “in a democratic society, no one individual or interest group can claim sole ownership of possible knowledge and meaning” (p. 17).

Beane and Apple argued schools and educators still too often “shirk” their responsibility to broaden opportunities to make meaning, following the “official and high status knowledge endorsed by the dominant culture” (p. 14). They issued a call to action to educators, urging progressive educators who genuinely care about democracy and young people need to stand up to oppression (p. 13). Although reformers like W.E.B. Du Bois, Carter Woodson, and Ella Flagg Young have made momentous changes in education, such as desegregating schools, much more work needs to be done to achieve true democracy in schools (p. 23).

There is a parallel between the development of systems thinking and the development of democratic education. One can discuss systems thinking at length, but the more it needs to be discussed, the less systems thinking is actually happening. Linguist and educator Noam Chomsky argued this very point when discussing democracy. He pointed out that

if schools were, in reality, democratic, there would be no need to bombard students with platitudes about democracy. They would simply act and behave democratically, and we know that does not happen. The more there is a need to talk about the ideals of democracy, the less democratic the system usually is. (Chomsky, 2000, p. 17)

In a recorded interview (2012), Chomsky was asked, “What is the purpose of education?” Chomsky broke down education into two purposes. The first is a focus placed on creating, inquiring, and understanding the past to drive the pursuit of knowledge, with emphasis on how the learner learns and what learners decide to make of their own education (Chomsky, 2012,

0:58). The other side of education Chomsky presented echoes the authors whose call for critical pedagogy is clear. Institutionalized and oppressive forces form education into a highly rigid and explicit structure. This is to impose an obedience and servitude on students that molds them to the expectations, if not demands, of those who have power on economic development (2:00).

As Apple wrote in *Can Education Change Society?* (2013), the realm of education can very well set the precedent for change that needs to take place both within schools and beyond them. As he wrote,

Education has been and is a truly powerful arena for building coalitions and movements, one whose social effects can echo throughout the society. In essence, they are central to creating lasting mobilizations and to enhancing skills and dispositions of interruptions based on building and defending community-wide norms of care, love and especially solidarity with each other. (Apple, 2013, p. 20)

Those norms are central to a sustainability-literate society. If a school were to truly embrace a democracy model, then care, love, and solidarity should inherently be embedded into the curriculum (Clingan, 2015, Gorman, 2015). And if those characteristics are inculcated and practiced by students through a curriculum and environment that make demonstrating those values a measure of success, then we may just realize the call of critical pedagogy, making further progress over the persistent oppressive and discriminatory forces forged into education.

Conclusion

The continued use and imposition of industrialized linear education as a form of colonization subjects learners to rigid instruction and excludes a student's unique cultural characteristics, forcing a homogenization of knowledge. As localized versions of sustainability education continues to grow in different cultures, environs, sectors, etc., it makes itself available and subject to all of the unique characteristics, norms, histories and challenges that make those various areas and the stakeholders who inhabit them what they are. This essay makes the call that a systems oriented curriculum can actively adapt and include these characteristics that students identify with. But many sustainability education designers and instructors continue to use linear constructs to teach sustainability, therefore compromising the systems thinking nature critical to sustainability literacy. So perhaps as we think about the redesign of educational models that leverage students and their communities, the question may be less of how can we better teach sustainability to satisfy sustainability objectives, but rather what can sustainability teach education to empower individuals and communities for the unique sustainability solutions they seek?

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