

Empowering Students through a “Certain Kind” of Education

Thirty Years On: An updated response to David Orr's What is Education For?

Isaac Cheek¹, Karrin Elise Tennant¹, Adrian Torti-Feener, and Sylvia Torti

¹ Contributed equally to first-authorship

E-mail: isaactcheek@gmail.com, karrin.ennant@utah.edu, feener.adrian@gmail.com, sylvia.torti@utah.edu

Received August 2022

Accepted for publication Sep. 2022

Published Dec. 2022

Abstract

Thirty years ago, environmental educator David Orr's provocative article "What is Education For? Six myths about the Foundations of Modern Education, and Six New Principles to Replace Them," prompted students and professors to question traditional conceptions and purposes of education in an era of ecological instability, a topic he continues to engage in. The dilemmas described by Orr have only intensified in recent years. In this paper, we will respond to the educational assessment and principles described by Orr in "What is Education For?" and contextualize them with contemporary issues. Then, we will propose four pillars—roughly based on Orr's principles—upon which to build a general education curriculum that equips students with tools to address modern-day ecological crises. Finally, we use the University of Utah's Honors Integrated Minor in Ecology and Legacy as a case study of how our proposed pillars might manifest in institutions of higher education.

Keywords: *Integrated Education, Ecology, General Education*

Introduction

When environmental educator David Orr wrote, "it is not education that will save us, but education of a certain kind," in his 1991 article, "What is Education For? Six myths about the Foundations of Modern Education, and Six New Principles to Replace Them," he postulated that fixing the flaws of our educational system would be a critical step in addressing the crises of our world (Orr, 1991; Orr, 2022). He argued that our failure to center the environment and natural limits in education had resulted in an inability to engage in systems-level thinking and an overly specialized workforce, which had resulted in highly trained professionals whose solutions did not consider broader repercussions. Traditional conceptions of education, he argued, had resulted in an era of ecological instability and required a

transformation of our educational system. We agree with Orr's postulation on the importance of an education of a "certain kind," and in this article, we build upon this idea by presenting a framework for a college-level general education curriculum that is capable of addressing the environmental crises students face.

Before outlining our proposed framework, we will address and update the assessments, assumptions, and proposals that Orr made, as significant research, discussion, and growth has occurred in the educational field in the last 30 years. We will acknowledge some of these areas of growth—particularly in regard to traditional knowledge, integrative education, experiential learning, and equity—and incorporate them into our proposal for a general education

system that builds upon and responds to Orr’s idea of an “education of a certain kind.”

As a part of an updated response to Orr, we propose four new action-oriented pillars upon which to build a general education framework that addresses the shortcomings of the current system and prepares students for the challenges they will face: (1) Pursue Standards of Sustainability & Equity, (2) Integrate Diverse Ways of Learning, (3) Teach Systems-level Thinking, and (4) Prioritize Student Empowerment to Overcome Defeatism. Then, we examine the University of Utah’s Honors Integrated Minor in Ecology and Legacy to see what some of these principles look like in an institutional setting.

We wish for society not to look back from 2051 and read how our education system—60 years after Orr first spoke—did not produce meaningful solutions to modern crises. To aid in re-imagining higher education before it is too late, this article proposes a framework of *how* to create a general education curriculum that provides students, professors, and the public with the mindset and tools to advocate for the paradigm shifts required to live sustainably in this threatened world.

Responding to Orr’s Assessment of Crisis

Orr begins his paper with a dreary overview of “a typical day on planet Earth” in 1991, one defined by rainforest loss, desertification, extinction, overpopulation, and atmospheric pollution. In the decades following his publication, the indicators of environmental peril have morphed, grown, and become increasingly threatening. We now refer to the issue as *the climate crisis*. The first step in forming an updated response to Orr is answering this question: what does a “typical day on planet Earth” look like 30 years later?

If today is a typical day on planet Earth, we will lose an estimated 126 square miles of rainforest—10 square miles more per day than in 1991 (Weiss & Goldman, 2020). We will lose an estimated additional 4,411 square miles to advancing deserts as a result of land mismanagement (Nunez, 2019). Roughly 150 species will go extinct compared to the 40-100 in 1991, and experts speculate that those numbers are gross underestimates (Pearce, 2015). Today, the human population will increase by 221,000 people; we will add 20,000 tons of plastic to the ocean and 118 million tons of carbon to the atmosphere (Worldometer, n.d.; Harvey, 2019; The World Counts, Plastic in the Ocean, n.d.). Tomorrow, the Earth will be slightly warmer, the water more

acidic, and biodiversity more imperiled. At the time of writing this, we are 26 years and 293 days away from losing all fish in the sea, 18 years and 293 days from running out of fresh water, and 78 years away from losing our rainforests (Worldometer, State of the planet). While these statistics are mere estimates, the fact that we do not really know the state of life and resources on our finite planet is indicative of the larger problem. What we do know is that we have severely destabilized the terrestrial and atmospheric systems upon which our world depends, and they are falling more out of balance by the day.

As the climate crisis intensifies, we are also facing alarming economic disparities. Upper income families in the United States have seen sharp rises in earnings since the 1970s as relative income has steadily decreased among lower and middle class families, with these gains and losses largely occurring along racial and geographical lines (Schaeffer, 2020). These economic disparities have further exacerbated ongoing socioeconomic-cultural disparities, and communities facing socioeconomic pressures are often positioned in the areas of greatest environmental devastation, which compounds the limitations to living standards, upward mobility, and access to education (Sommeiller et al., 2016). These socioeconomic-cultural disparities have the potential to destabilize our institutions and democracies, and they are not restricted to the United States, but are seen on a global level as well (Orr, 2022).

Responding to Orr’s Assessment of Modern Education

Orr argued that the underlying processes that led to our current crisis were born from six educational myths, and then he proposed six educational principles to counter these myths (Table 1). Here we weave Orr’s compelling ideas into contemporary thought and literature to propose a simpler four-pillar framework that is intuitive for universities to adopt. To begin, though, it is important to note some of the key concepts mentioned by Orr.

Orr’s Myths	Orr’s Proposed Principles
<i>Ignorance is a solvable problem, rather than part of the human condition.</i>	<i>All education is environmental education;</i>
<i>With enough knowledge and technology we can manage</i>	<i>The goal of education is not mastery of subject matter, but of one’s person</i>

<i>planet Earth, as if it were a machine;</i>	
<i>Knowledge is increasing and by implication human goodness, despite ample historical evidence to the contrary;</i>	<i>Knowledge carries with it the responsibility to see that it is well used in the world;</i>
<i>We can adequately restore that which we have dismantled, which assumes we understand natural systems in ways that we do not;</i>	<i>We cannot say that we know something until we understand the effects of this knowledge on real people and their communities;</i>
<i>The purpose of education is that of giving you the means for upward mobility and success, ignoring the larger goals of self-growth and civic engagement;</i>	<i>The importance of "minute particulars" and the power of examples over words;</i>
<i>Our culture represents the pinnacle of human achievement: we alone are modern, technological, and developed.</i>	<i>The way learning occurs is as important as the content of particular courses.</i>

Table 1: Orr’s Myths and Principals (Orr, 1991)

We believe it is essential to re-emphasize Orr’s point that, “education is no guarantee of decency, prudence, or wisdom” (Orr, 1991). It was not a lack of education that led us into the climate crisis. Rather, much of the economic effort and innovation in fields that led to efficient extraction, fishing, deforestation, and energy production were conducted by highly educated individuals with the intent of advancing civilization. Therefore, we concur with Orr that education has the potential to effect change, and we also agree that education continues to contribute to the problem. The shortcomings of our current system have led to a highly efficient, growing global population that is severely lacking the ecological literacy necessary to make sustainable policy and personal choices. As Orr argues, it is not just any type of education that will save us, but rather, a *certain kind* of education that can save us.

Orr also places an emphasis on reverently acknowledging the Earth’s interconnected and ever-changing environmental systems that operate within natural limits (e.g., physical, chemical, and ecological) rather than attempting to overpower them with human force and knowledge. This idea

appears throughout his paper in different forms, but generally supports an approach towards education that focuses on systems-level thinking and ongoing learning rather than only the mastery of specific technical concepts. Being aware of Earth systems and being open to what we *do not* know is an important element of building ecological literacy. Orr draws upon the Greek concept of *paideia* when he says “the goal of education is not mastery of subject matter, but of one’s person.” Universities should encourage individuals to embark on a personal, continuous process of learning how to work with the Earth rather than overcome it, to produce a generation of “people who live well in their places.” Orr’s emphasis on continued learning about the interconnectivity of Earth systems is one that we adopt and build upon later in this article through the lens of indigenous education, traditional knowledge, and systems-level thinking.

Four Pillars of Sustainable Education

The future that Orr described in 1991 has become reality, and the effects of declining environmental health are intensifying rapidly. The implementation of new educational paradigms is paramount. We must ask ourselves how to turn the pivotal work of educators like Orr into a reality. How does a sustainable system of education look, not only in theory, but in practice? What are the logistical hurdles between our current general education curriculum and one that effectively addresses the novel issues facing today’s students? To begin answering these questions, we propose four pillars upon which to build general education curriculums. These pillars are based on Orr’s six original myths and principles, but they also incorporate compelling work done by other educators in recent years. We envision that pillars like these will begin to play a part in general education curriculums at undergraduate institutions, eventually appearing in class syllabi and playing a critical role in university-wide planning efforts.

Pillar #1: Pursue Standards of Sustainability and Equity

Given our goal of building a general education curriculum that adequately prepares students for the challenges they will face, it is paramount that sustainability and equity are interwoven with our proposed integrated curriculum, as they go hand in hand, and both are integral to addressing the climate crisis. The United Nations Report of the World Commission on Environment and Development describes sustainability as “meeting the needs of today without compromising the needs of future generations,” and goes on

to add that social equity from generation to generation is also an important element (Brundtland, 1987). Scholars Agyeman, Bullard, and Evans go as far as to say, “A truly sustainable society is one where wider questions of social needs and welfare, and economic opportunity are integrally related to environmental limits imposed by supporting ecosystems” (Agyeman et al., 2002). We agree with the large body of scholars and institutions who view equity as a crucial element of sustainability and that both of these practices must be prioritized in order to address and mitigate the ongoing climate crisis. These two standards of higher education must be pursued through ways of learning, problem solving, and empowerment as outlined in our following pillars.

Pillar #2: Integrate Diverse Ways of Learning

Historically, general education coursework explicitly targeted the “integration of knowledge for purposes of engagement with the problems of contemporary civilization” (Brint, 2009). Unfortunately, general education in its current form falls short of achieving these outcomes. Students typically complete requirements by selecting introductory and isolated courses from broad categories of arts, humanities, social sciences, and natural sciences. They experience this potpourri of courses with a ‘checklist’ mentality, rather than through simultaneous, intersecting, and deeply engaging experiences.

Teaching these subjects in isolation from their worldly impacts implies that they exist in a vacuum—which they do not. A general education curriculum is a place for students of all majors to find intersections between arts, sciences, literature, economics, and the environment. As Orr says, “all education is environmental education.” Economics is deeply related to ecology, biology is deeply related to the humanities, and so on. The syllabi of general education courses should reflect this interrelatedness by integrating information and perspectives from multiple disciplines. To teach general education in a non-integrated fashion is to under-prepare students to live and work with the deeply interconnected ecologies of our world.

Along with the integration of traditional academic disciplines, the integration of local knowledge will be key in creating curricula that promote the consideration of natural limits and cycles while instilling the importance of adaptability according to resource availability in a constantly changing environment. Local knowledge and limits have been lacking in general education, which, when paired with

unchecked capitalistic ideals, creates a toxic cocktail of overharvesting, overuse, and mismanagement of the environment. Orr promotes the importance of “ecological literacy” to address this issue and describes how a population that does not understand natural principles—like the forces governing energy, entropy, environmental succession, carrying capacity, etc.—cannot live sustainably. While we agree with Orr’s sentiment, we believe that the incorporation of local, indigenous, and non-Western knowledge should also have a place in an integrated general education curriculum.

Many native cultures around the world have engaged in sustainable ways of managing the land, abiding by different principles than modern Western culture. Long, intimate histories with the land have granted many native peoples deep knowledge of their local ecosystems and interconnected relationships within them. Together with an understanding of natural limits and cycles, deep local knowledge can produce traditional land and water management practices that are exceedingly more sustainable than current Western practices (Whyte, 2018). A United Nations-backed report by the Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES) found that species decline and pollution occur at slower rates on indigenous peoples’ lands, which make up at least a quarter of the land on Earth (media release, nature’s dangerous decline, 2020). Specifically, this report describes sustainable ways of gardening, herding, and forestry practiced by North American indigenous peoples that contribute to this reduced rate of deterioration.

A growing field, labeled “indigenous climate change studies” by Whyte should be incorporated into college curriculums as a part of our second pillar of general education. This field uses first-hand indigenous knowledge to create comprehensive climate resiliency plans, policy documents, academic articles, working groups, and declarations (Whyte, 2017). Growing rapidly, this field is drawing upon a valuable body of knowledge that has been generated over thousands of years to decolonize climate action. Just as the integration of traditional Western disciplines supports thinking in sustainable and equitable terms, indigenous climate change studies should also play a role in this integration, giving students deeper knowledge for productive decision making.

We also embrace culturally sustaining pedagogy and care ethics as teaching models. Culturally sustaining pedagogies, as proposed by Paris, value our multiethnic and multilingual population, fostering “linguistic, literate, and cultural

pluralism as part of the democratic project of schooling” (Paris, 2012). As part of this cultural pluralism initiative, readings should include historical accounts of traditional native land practices as well as current native sustainability efforts. These texts will stand in opposition and cooperation with more commonly reviewed Western texts to provide students with a multiethnic context of environmental action. Further, culturally sustaining pedagogy leads to greater accessibility for a diversity of students and reduces barriers to participation. Discussions in the classroom should explore different approaches to knowledge and environmental action and how new paths can be synthesized to produce effective and sustainable resource use. We aim to push the culturally sustaining pedagogy beyond texts and classroom discussion; students should visit with local experts and learn from instructors who hold the knowledge of how to live sustainably on the land where students are taught. Finally, the notion of care ethics insists that the subjects of ethical discourse must be included in those discussions. We must “includ[e] the cared for as an active participant” (Noddings, 2009). This is indeed a tall order for us humans if we are to consider the more-than-human world as active participants, but one we believe is well worth the effort. Care ethics coexist with the notion that “no student should graduate without understanding that they are kin to all that has been, is, or ever will be” (Orr, personal communication, 2022). We believe that we develop these caring relationships by engaging our intellectual and emotional selves with the larger world through lenses of science, sociology, humanities, and art.

Our proposed general education curriculum framework combines the traditional knowledge that informs sustainable practices with modern education and technology to hopefully create practical solutions at local or regional scales. Then, when students graduate and face land and water use issues throughout their lives, they will be equipped with the tools to adequately consider natural limits and dynamic cycles in their decisions.

Pillar #3: Teach Systems-level Thinking

A general education curriculum that prioritizes integrative education will give students the breadth of knowledge required to grasp the complexities of today’s environmental crises, but this knowledge will be inadequate if students are not equipped with the problem-solving strategies necessary to implement change. We are not interested in catalyzing change that only satisfies immediate needs; we hope that this curriculum will inspire change that accounts for the

implications of our technologies, politics, and life choices across space and time. To pursue this goal, we propose the implementation of systems-level thinking as a tool used in all general education courses to develop students’ attention to the cascading social, ecological, economic, and political impacts of proposed solutions.

Systems-level thinking is “a way of exploring and developing effective action by looking at connected wholes rather than separate parts” (Civil Service Live, 2012). This way of thinking emphasizes connectedness, relationships, and interactions, all of which are crucial elements of an integrated education curriculum that intends to prepare students for ecological crises while adhering to the important standards of sustainability and equity.

Beyond learning how to conceptualize system-based problem-solving in the classroom, it is imperative that students have the tools to produce effective solutions post-graduation. How do we ensure that students retain the systems-level thinking concept after their general education is finished? We suggest that students be assessed in a manner that encourages and refines systems-level thinking through a “systems thinking learning outcome rubric” (Cachelin et al., 2019). Implementing a measurable evaluation, such as this rubric, is one of the first steps universities should take toward an integrative general education curriculum that prioritizes sustainability and equity. Adopting this type of rubric requires that courses are connected, integrated, and that learning outcome assessments can measure higher level thinking and problem solving.

Beyond implementing a course rubric similar to the one mentioned above, other options have been explored for teaching, assessing, and quantifying systems-level thinking. Visual tools such as cognitive maps have been effectively used for analyzing complexity of systems-level thinking (Levy et al., 2018). Additionally, traditional assessments such as essay questions, class discussions, and seminars should be modified to include systems-level thinking rather than only the memorization of technical information. This mode of assessment will better prepare students to understand interconnectedness, natural limits, and cycles as they approach complex global issues after graduation.

Pillar #4: Prioritize Student Empowerment to Overcome Defeatism

An integrative general education curriculum that uses systems-level thinking and adheres to the standards of sustainability and equity will ideally give students the tools that are necessary to address modern issues. However, it will also expose these students to the slew of highly concerning and often disheartening issues that they are likely to face for the remainder of their lives. Deforestation, desertification, extinction, sea-level rise, economic disparity; the list goes on. These burdens have led to “eco-anxiety,” a term used to describe the extensive mental health effects the climate crisis is having on students (Panu, 2020).

When students are confronted with these daunting challenges—especially within their first year of college—it can become overwhelming and discourage them from seeking solutions. After all, what can one person do?

This defeatist mindset is a symptom of an educational system that presents copious challenges to students but fails to empower them to find solutions. As students and educators, we recognize the emotional burden that comes with a deep awareness of the climate crisis, and we seek to alleviate some of this burden. The fourth pillar of our proposed general education curriculum—prioritizing empowerment to overcome defeatism—provides crucial support for pillars #1, #2, and #3. If students are not empowered to implement their knowledge and create positive impacts on the world—both during and after their studies—then our educational curriculum becomes void of purpose. If our curriculum makes the majority of students feel helpless, we have failed.

How do we empower students in the face of such novel and extreme challenges? This will be no easy task, and it will certainly require some experimentation. That said, there are two compelling pedagogies that, when combined, serve as a good starting point: problem-based learning (PBL) and experiential education. PBL, where educators encourage students to work collaboratively to find solutions to real-world problems, is an effective way for the classroom to address crises in a way that empowers students to act rather than engendering them with an unproductive sense of defeatism (Akçay, 2009).

One of the key assumptions of PBL is this: “when we solve the many problems we face every day, learning occurs (Jonassen & Hung, 2008).” When it comes to the

college-level general education that we seek, it is crucial that students are immersed in the context of real-world problems rather than removed from them via courses that focus purely on subject matter. See Orr’s “Building as Pedagogy: Oberlin’s Adam Joseph Lewis Center” for a good example (Orr, 2021).

An essential complement to PBL, experiential education is based on experiential learning theory (ELT). ELT posits that “learning is the process whereby knowledge is created through the transformation of experience,” and experiential education therefore involves providing students with experiences from which they can learn (Kolb & Kolb, 2005). Authors for educational theories and pedagogies suggest that experiential education works well as an institutional response to Orr’s sixth principle, which states that “the way learning occurs is as important as particular courses,” because experiential education closes the gap between class content (lectures, readings, exams) and real-world experiences (Roberts, 2008).

Long-term examples of experiential education suggest that the student immersed in the space that inspired the course material will retain interest and knowledge more so than their peers. In his article, “The Possibilities and Limitations of Experiential Learning Research in Higher Education,” Jay Roberts highlights that if appropriately deployed, these pedagogies can help, “counter the persistent critique that colleges and universities do not prepare students adequately for the world of work” (Roberts, 2008). The workplace is often a dynamic and complex mixture of social, environmental, psychological, and practical problems that can create a challenging work experience. Colleges often fail to integrate practical and technical skills with the reality of people and the environment in the modern workplace, which ultimately under-prepares students for the challenges they will face. Experiential education ideally combats this under-preparation, which should allow students to feel more confident when approaching problems throughout their careers.

The combination of confidence provided by experiential education and the problem-solving skills from PBL will empower students to address the large-scale human challenges they learn about in their integrated general education curriculum. By not only providing students with a long list of problems but also giving them a chance to practice solving them, we hope to alleviate the cloud of defeatism that too often hovers above classrooms that discuss these emotionally taxing issues.

Integrated General Education: An Experimental Curriculum

We, as teachers and students, have been experimenting with integrated delivery of general education in a minor called Ecology and Legacy. The goal of this minor is to offer an integrated set of general education courses and experiences in a cohort model, partly taught in the field, to help students develop a systems-level approach to understanding ecology, sustainability, and human flourishing. The interdisciplinary approach merges biology, the humanities, arts, and writing around environmental, place-based concerns, and is meant to spur a more focused approach that merges theory and practice while bringing cultural, literary, and historical contexts to bear on practical and current scientific issues. The Ecology and Legacy program prompted conversations that eventually led to the four pillars that we have suggested in this article.

In constructing this program, we started, of course, with the tenant of the ecological foundation of life. Yet, ecology is more than biology. In this minor, students engage in an integrated scientific discourse while referencing relevant works within the humanities and contemplating implications for the human experience. Learning scientific principles through the lens of the humanities offers students the unique opportunity to form new pathways of understanding. For example, students read the contrasting theories of evolution as presented through Darwin's competitive *Origin of Species* versus Donna Haraway's cooperative symbiogenesis concept (Darwin, 1859; Haraway, 2016). They deliberate over the merits and interactions of these pieces and position themselves in the discussion. In the same conversation, the Old Testament book of Genesis, tales of American Folklore, or local native stories may be introduced as points of origin for the many species of the Earth.

While humans have become the dominant species in ecosystems, we are in fact only one of the millions of species that inhabit this earth. In order to position humans as embedded in our natural world, we use David Abrams' concept of the *more-than-human*, which flags the way that humans are immersed in a living world, and indeed how humans move through the world—not apart from it—but through interaction within it (Abram, 1997). Through studying theories of ecology, animal behavior and human behavior/personal choices, art, literature, and history, we can identify the ways in which we are immersed, embedded, and dependent on the more-than-human world. Indeed, our actions are in fact inter-actions. Each decision we, as individuals or communities, make ripples across our given

ecologies—environmental, social, and mental (Guattari, 2000). An integrated general education recognizes this entanglement and causes students to observe dynamic, interrelated aspects of natural and human systems. The broad goals of this integrated minor, which we will measure, are to answer these three questions: 1) How do we acquire knowledge? 2) What are the diversity of ways in which organisms “make a living” by using, exploiting, and sharing available natural resources? 3) Given the unique “human condition” and our ability to violate natural limits, how do we understand, interpret, challenge, and sustain our lives in the context of multiple cultures, social and economic systems? Students are encouraged to contemplate limits across scales, thinking about personal habits of consumption in addition to various community and cultural practices.

As previously mentioned, the program is structured in a cohort model wherein a group of students take six courses together, three of them in an intensive field block. This integrated approach engages the big issues, gets students off-campus, and creates cohorts of students that are sustained over multiple semesters. These cohorts work as a kind of forcing function for students to learn about themselves in the context of community, as they develop dynamic relationships with cohort members, instructors, and themselves over time and experience. This positioning of self within a diverse, sustained group is central to our goals of practicing dialogue and speaking across differences—both so critical to democracy.

The Ecology and Legacy program is not an example of the successful implementation of our four proposed pillars, but rather *an experiment* from which our pillars were born. By participating in the complex conversations that arose from coursework that spans disciplines, we affirmed the value of integration. By experiencing the empowerment that came from implementing self-designed field studies on Southern Right Whales in Argentina, we learned of the confidence that can be generated by problem-based learning and experiential education. By traveling and living with people from different cultures who interact with and rely upon their local ecosystems on a daily basis, we felt an incredible depth of local knowledge. All of these elements of Ecology and Legacy, plus many more, have contributed to the formation of our four proposed pillars.

Conclusion

By calling upon lessons from the Ecology and Legacy experience, contemporary educational and environmental

literature, and David Orr's pivotal "What is Education For?", we have proposed four pillars for a college general education curriculum capable of addressing the crises of our modern world. These four pillars are not universal truths, nor are they immune from growth and change, but they can serve as a foundation upon which we can begin to address, *with action*, Orr's statement: "it is not education that will save us, but education of a certain kind."

References

- Abram, D. (1997). *The spell of the sensuous: Perception and language in a more-than-human world*. Vintage.
- Agyeman J., Bullard R.D., & Evans, B. (2002). Exploring the nexus: Bringing together sustainability, environmental justice and equity. *Space and Polity* 6(1):77–90. DOI 10.1080/13562570220137907
- Akçay, B. (2009). Problem-based learning in science education. *Journal of Turkish Science Education*, 6(1), 28–38.
- Brint, S., Proctor, K., Murphy, S. M., Turk-Bicakci L. & Hanneman, R.A. (2009). General education models: Continuity and change in the U.S. undergraduate curriculum, 1975–2000. *The Journal of Higher Education*, 80(6), 607.
- Brundtland, G. H. (1987). *Our common future: Report of the World Commission on Environment and Development*. Oxford University Press.
- Cachelin, A., Darling, A., Clark, B. & Hackford-Peer, K. (2019). Weaving equity and sustainability into the fabric of higher education: The University of Utah experience. *Sustainability* 12(6), 304-309.
- Civil Service Live. (2012). Systems thinking is a way of exploring and developing effective action by looking at connected wholes rather than separate parts. Introduction to Systems thinking. Report of GSE and GORS seminar. *Government Office for Science*.
- Darwin, C. (1859). *The origin of species*. John Murray.
- Guattari, F. (2000). *The three ecologies*. The Athlone Press.
- Haraway, D. J. (2016). *Staying with the trouble: Making kin in the Chthulucene*. Duke University Press.
- Harvey, C. (2019). CO₂ emissions will break another record in 2019. *Scientific American*.
<https://www.scientificamerican.com/article/co2-emissions-will-break-another-record-in-2019/>
- Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services. (2020). Nature's dangerous decline 'unprecedented'; species extinction rates 'accelerating'. *IPBES*.
<https://ipbes.net/news/Media-Release-Global-Assessment>
- Jonassen, D. H., & Hung, W. (2008). Problem-based learning. *Handbook of Research on Educational Communications and Technology* (3rd ed., p. 488) Routledge.
- Kolb, A. Y., & Kolb, D. A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of Management Learning & Education*, 4(2),193–212.
- Levy, M.A., Lubell, M.N., & McRoberts, N. (2018). The structure of mental models of sustainable agriculture. *Nature Sustainability*, 1, 413–420.
<https://doi.org/10.1038/s41893-018-0116-y>
- Noddings, N. (2009). *The Oxford Handbook of Philosophy of Education*. Oxford University Press.
- Nunez, C. (2019). Desertification, explained. *National Geographic*.
www.nationalgeographic.com/environment/article/desertification
- Orr, D. (1991). What Is Education For? Six myths about the foundations of modern education, and six new principles to replace them. *In Context, The Learning Revolution*. <https://www.context.org/iclib/ic27/orr/>
- Orr, D. W. (2021). Building as pedagogy: Oberlin's Adam Joseph Lewis Center. *Buildings & Cities*.
<https://www.buildingsandcities.org/insights/research-pathways/building-pedagogy.html>
- Orr, D. (2022). Education & the great transition. *Holistic Education Review* 2(1).

- Panu, P. (2020). Anxiety and the ecological crisis: An analysis of eco-anxiety and climate anxiety. *Sustainability* 12(19), 7836. <https://doi.org/10.3390/su12197836>
- Paris, D. (2012). Culturally sustaining pedagogy: A needed change in stance, terminology, and practice. *Educational Researcher*, 41(3), 93–97.
- Pearce, F.(2015). Global extinction rates: Why do estimates vary so wildly? *Yale Environment* 360.
- Roberts, J. (2008). From experience to neo-experiential education: Variations on a theme. *Journal of Experiential Education*, 31(1), 19–31. <https://doi.org/10.1177/105382590803100104>
- Schaeffer, K. (2020). 6 facts about economic inequality in the U.S. *Pew Research Center*.. <https://www.pewresearch.org/fact-tank/2020/02/07/6-facts-about-economic-inequality-in-the-u-s/>
- Sommeiller, E., Price, M. & Wazeter, E. (2016). Income inequality in the U.S. by state, metropolitan area, and county. *Economic Policy Institute*. <https://www.epi.org/publication/income-inequality-in-the-us/>
- Spring Creek Project. (2018). *Indigenous Peoples and Climate Justice* by Kyle Powys Whyte [Video]. YouTube. <https://www.youtube.com/watch?v=7YPvsOCUh18>
- Weisse, M. & Goldman, E. D. (2020). We lost a football pitch of primary rainforest every 6 seconds in 2019. *World Resources Institute*. <https://www.wri.org/blog/2020/06/global-tree-cover-loss-data-2019>
- Whyte, K. (2017). Indigenous climate change studies: Indigenizing future, decolonizing the anthropocene. *English Language Notes*, 55(1-2).
- Weisse, M., & Goldman, E. D. (2020). We lost a football pitch of primary rainforest every 6 seconds in 2019. *World Resources Institute*. <https://www.wri.org/blog/2020/06/global-tree-cover-loss-data-2019>
- The World Counts (n.d.) Plastic in the ocean. <https://www.theworldcounts.com/challenges/planet-earth/oceans/plastic-in-the-ocean/story>
- The World Counts (n.d.) State of the planet. <https://www.theworldcounts.com/challenges/planet-earth/state-of-the-planet>
- Worldometer (n.d.) Current world population. <https://www.worldometers.info/world-population>

Acknowledgement

Isaac Cheek is a graduate of the University of Utah and is faculty for the University's Ecology and Legacy East Africa program. When not working for the University of Utah, he resides in southwest Montana where he works in the environmental nonprofit field.

Sylvia Torti is an ecologist and creative writer and is currently the dean of the Honors College at the University of Utah where she developed the Integrated Minors program. The lead authors, Isaac Cheek ('22, Honors Bachelor of Science in Political Science and Environmental Studies and Sustainability) and Karrin Tennant ('21, Honors Bachelor of Science in Biology) are alumni of honors college, participants in the minor and now teaching fellows. Adrian Torti Feener, ('22, B.A. Environmental Studies and Sustainability, Earlham College) also contributed to this paper.