

The Permaculture Education Standards

This document features excerpts from *The Advanced Permaculture Student* by Matt Powers (2019).

These standards were written by Matt Powers but refined and edited with the help of the global permaculture community and professional educators and administrators from all corners of the world. It is our hope and determined focus to bring Permaculture Education into all K-12 school programs as the foundation for all education.

The Purpose of Permaculture Education Standards

Teachers need standards to guide and align their lessons and assessments – administrators need them as well to adequately support, critique, and guide teachers. Standards are the lynchpin and measuring rod for a given subject. Iterating a subject out over time allows it to be thoroughly taught, deeply understood, and, at the same time, communicated and taught within the zone of proximal development. For permaculture, it is no different: educators want clear standards and lesson plans aligned to cognitive and behavioral abilities and expectations that match the developmental stage of that age group.

What Is Permaculture?

Permaculture is an ethical lens that uses nature's patterns and cycles to care for people, the Earth, and the future. It is finding balance and harmony with the natural world: a simple and ancient concept that is missing from modern daily life, and includes economic behavior, education, as well as entertainment. The abundance of the natural world is the foundation for all culture, economies, and life on Earth, so expanding and regenerating that foundation is the highest priority, the noblest calling, and the basis of all positive and productive interaction and education. Since education is how we shape our workforce, it is how we shape our economy. If we want a new economy, we have to embrace a new education system. If we want a regenerative economy, we must create a regenerative education system that guides a new generation to a new economy. Permaculture is the lens through which we can see that regenerative future.

There are many different words and names currently being used to describe partnering with nature. Why not use biomimicry? Why not agroecology? Why not agroforestry? While each of these concepts is powerful, vital, and compelling, they are part of a whole: Permaculture. The principles and ethics in permaculture make it unique – it helps guide interaction from micro to macro, personal to interpersonal, praise to discipline, privilege to responsibility, and further. Permaculture is a holistic concept that covers full spectrum of regenerative concepts, systems, and solutions. The organization, guiding ethics and principles, and holistic nature are

what makes permaculture unique and the lynchpin in the regenerative movement and all future education.

Why Permaculture?

Permaculture is the core and foundation for all ethical education; it is interacting with other people, all forms of life, and the Earth with respect and care for the future. All variation is circumscribed by these boundaries. It is the birthright of every human being to know how to live regeneratively and ethically on Earth, so it should be the frame through which all education is viewed. To neglect or deny anyone the knowledge of how to support themselves without depleting or destroying their natural resources and to live ethically with other people and the living world is to deny them the most fundamental right of a living being.

Pattern literacy, a fundamental permaculture concept, is our most fundamental learning schema. The way we develop our understanding one subsection at a time to form a whole schema IS pattern literacy. We learn through patterns and then form them into holons (whole systems) or schema. The more developed our literacy, the more developed and detailed our schema: this is exactly how Olympic figure skaters coordinate innumerable body movements into a graceful and complete maneuver while skating on ice and leaping through the air. For children and young adults, being able to see the patterns within all systems, micro to macro, from the bioregional to the global whole is critical to giving students the deep analytical and observational skills needed to restore and regeneratively manage our world's fragile network of stressed ecosystems.

Permaculture involves and connects all disciplines: science, history, math, reading, writing, listening, speaking, design, engineering, physics, geography, geology, ecology, environmental science, organic chemistry, soil science, biology, agriculture, horticulture, animal husbandry, cooking, seed saving, art, problem solving, critical thinking, team work, reciprocity, compassion, and much more – it is everything within and touched upon by the 3 Ethics: Earth Care, People Care, & Future Care. It's everything we humans do that is positive and regenerative. It's how we grow and prepare our food – from seed to table back to soil again. It's the full cycle in every context. Every human being should know how to grow food, save seed, and prepare food as a basic building block for all of their education. In addition, every human being should have an education rooted in ethics that helps guide them on a path to a positive and abundant future for themselves and with everyone they interact with directly and indirectly. These ethics support and guide all the concepts that follow, so it's implicit in all aspects of life – even in discipline, governance, and currency.

Blending permaculture into lessons isn't hard, but it does require fluency in the topic you are teaching – you must know it well enough to explain it from different perspectives, so that it makes sense through multiple learning modalities and to multiple types of intelligences. It can be as simple as using the seeds the students just learned to save for a counting or basic

arithmetic activity. It could be as advanced as designing and building working renewable energy, waste management, and water harvesting systems in high school and college programs. Math, science, engineering, electronics, physics, biology, microbiology, organic chemistry, and ecology can all be authentic, challenging, and rigorous; but when couched in engaging, student-centered, project-based, and hands-on learning experiences, the learning becomes supercharged and complexities and challenges are seen as fun and interesting. The permaculture standards, principles, and ethics will serve as the backbone and foundation for all education with all subjects and disciplines branching off of them. We can teach young children high level science, social skills, and regenerative concepts in a way that will reinforce their education and advance their progression, lengthening their strides of achievement and comprehension towards mastery in key life learning skills.

Elementary

(Identification, Comprehension, & Basic Skill Acquisition)

1. Comprehension

- 1.1 Students are able to identify and define core concepts: the 3 Ethics and the definition of permaculture
- 1.2 Students are able to identify and describe permaculture in context

2. Knowledge

- 2.1 Students are able to share multiple examples of permaculture in action
- 2.2 Students are able to identify and list multiple regenerative solutions for local energy, food, water, and waste management needs
- 2.3 Students are able to identify their bioregion and watershed
- 2.4 Students are able to identify 10-20+ local native plants, 5-10+ native pollinators, 5-10+ local fungi, and 10-20+ local animals as well as their roles and interactions in their bioregional ecosystem
- 2.5 Students are able to identify 20-40+ annual and perennial garden and food forest plants
- 2.6 Students are able to identify, create a representation of, and explain the water cycle, the carbon cycle, the solar cycle, and the bioregional seasonal conditions

3. Design

- 3.1 Students are able to design a simple garden on paper
- 3.2 Students are able to design a simple home site on paper, including regenerative solutions for energy, food, water, waste, and shelter
- 3.3 Students are able to identify, create, and comprehend simple maps and designs

4. Regenerative Skills

- 4.1 Students are able to grow a diversity of plants from seed
- 4.2 Students are able to harvest and preserve seed for the next season
- 4.3 Students are able to harvest and prepare food they have grown or helped grow in a variety of ways, forming several complete meals from their garden or food forest
- 4.4 Students are able to assist in setting up and managing a garden
- 4.5 Students are able to preserve food in a variety of ways (canning, drying, pickling, etc.)
- 4.6 Students are able to make vermicompost (using worms) to process food waste

5. Social Skills

- 5.1 Students are able to identify, define, and share examples of compassion, empathy, and people care

- 5.2 Students have participated in service, connecting natural principles to social principles
- 5.3 Students are able to model nonviolent communication and restorative justice skills in everyday settings

6. Self Smart Skills

- 6.1 Students are able to write out their holistic goals
- 6.2 Students are able to meditate for 5-10 minutes at a time
- 6.3 Students are able to do rudimentary exercise and stretching, primarily through physical play, dance, and games as well as yoga, qigong, tai chi, and jogging
- 6.4 Students are able to develop healthy and balanced meal ideas based on bioregionally and homestead or school garden sourced foods

Middle School

(Identification, Comprehension, Application, Analysis, Synthesis, Intermediate Skill Acquisition, & Service)

1. Comprehension & Analysis

- 1.1** Students are able to identify, define, apply, and synthesize key concepts: the 3 Ethics, permaculture principles, social permaculture principles, and the definition of permaculture
- 1.2** Students are able to present and teach a variety of permaculture skills and concepts to others using multimedia, public speaking, social media, and other modalities

2. Knowledge

- 2.1** Students are able to identify and map their bioregion and watershed
- 2.2** Students are able to identify 20-50+ local native plants, 10-20+ native pollinators, 10-20+ local fungi, and 10-30+ local animals, their roles and interactions within the ecosystem as well as any related indigenous history and uses
- 2.3** Students are able to identify 50-100+ annual and perennial garden and food forest plants and their native origins and uses
- 2.4** Students are able to identify, grow, harvest, and cook edible and medicinal mushrooms
in an outdoor setting (shiitake, oyster, reishi, etc.)
- 2.5** Students are able to identify, create a detailed representation of, and teach the water cycle, the mineral cycle, the carbon cycle, and the global annual seasonal cycle in relation to the sun
- 2.6** Students are able to identify and describe the different components of soil, the soil food web, and photosynthesis in relation to the soil food web

3. Design

- 3.1** Students are able to create a basic permaculture design for a home site
- 3.2** Students are able to design, set up, and manage a small garden or garden plot

4. Regenerative Skills

- 4.1** Students are able to problem solve using permaculture and explain why and how
- 4.2** Students are able to grow a broad diversity of plants from seed, cuttings, and tubers
- 4.3** Students are able to harvest and preserve a broad diversity of seed for long-term storage, forming their own seed bank
- 4.4** Students are able to prepare and preserve food they have grown or helped grow in a variety of ways, forming a diversity of meals and preserves that are shared, consumed with the class, taken home, or sold
- 4.5** Students are able to make both thermophilic (hot) compost and vermicompost (using worms) to process food waste

4.6 Students are able to cultivate aquatic plants and animals in a small controlled environment and observe and assist in cultivating aquatic plants and animals in a larger context

5. Social Skills

- 5.1** Students have participated in several permaculture service projects each year, pairing the social principles of permaculture with natural principles – providing a minimum of 15 hours of community service
- 5.2** Students are able to identify, define, share, plan, promote, and participate in actions of compassion, empathy, and people care
- 5.3** Students are able to model nonviolent communication and restorative justice skills in everyday and conflict mediation settings

6. Self Smart Skills

- 6.1** Students are able to write out their holistic goals
- 6.2** Students are able to meditate for 15-20 minutes at a time
- 6.3** Students are able to do regular exercise and stretching, like yoga, qigong, tai chi, calisthenics, jogging, and other forms of physical fitness activities, like dance, sports, and/or martial arts
- 6.4** Students are able to develop healthy and balanced meal ideas based on bioregionally and homestead or school garden sourced foods

High School

(Identification, Comprehension, Application, Deep Analysis, Synthesis, Creation, Critique, Advanced Skill Acquisition, Community Building, & Service)

1. Comprehension, Analysis, & Critical Thinking

- 1.1** Students are able to identify, define, apply, and synthesize permaculture concepts and practices as well as all permaculture ethics and principles and use them critically and creatively
- 1.2** Students are able to problem solve using permaculture and explain why and how in a presentation, through teaching, social media, and other modalities
- 1.3** Students are able to present and teach a variety of the skills and concepts to others using multimedia, public speaking, social media, and other modalities
- 1.4** Students are able to use permaculture as a lens to problem solve in a diversity of novel and real-life scenarios ranging from ecosystemic to social, local to global

2. Knowledge

- 2.1** Students are able to identify and map their bioregion and watershed digitally and on paper using topographic mapping, keyline geometry, and map and graphic editing programs
- 2.2** Students are able to identify 50-100+ local native plants, 15-30+ native pollinators, 15-40+ local fungi, and 15-40+ local animals, their roles and interactions in the local ecosystem as well as any related indigenous history and uses
- 2.3** Students are able to identify 100-200+ annual and perennial garden and food forest plants and their native origins and uses
- 2.4** Students are able to identify, grow, harvest, process, preserve, and cook edible and medicinal mushrooms in both outdoor and indoor settings
- 2.5** Students are able to identify, create detailed representations of, and teach the water cycle, the mineral cycle, the carbon cycle, and the global annual seasonal cycle in relation to the sun especially in relation to climate change and desertification
- 2.6** Students are able to identify, describe, and present the different components of soil, the soil food web, photosynthesis in relation to the soil food web, and ways to improve soil and soil food web interactions
- 2.7** Students are able to identify, describe, illustrate, and present the various interactions and function of trees and forests in relation ecosystems, natural cycles, precipitation, watersheds, soil, fungi, climate change, wildfires, and all biodiversity

3. Design

- 3.1** Students are able to identify, map, and analyze their bioregion and watershed using keyline geometry and patterning
- 3.2** Students are able to create an advanced permaculture design for a home site – one that addresses water, waste, food, soil building, energy, and shelter

3.3 Students are able to design, set up, and manage a small outdoor garden, indoor garden, greenhouse garden, and larger outdoor garden

4. Regenerative Skills

- 4.1** Students are able to grow and teach others how to grow a broad diversity of plants from seed, cutting, and tuber
- 4.2** Students are able to harvest and preserve a broad diversity of seed for long-term storage, expanding and replenishing their own seed bank
- 4.3** Students are able to prepare and preserve food they have grown or helped grow in a variety of ways, forming a diversity of meals and preserves that are shared, consumed with the class, taken home, or sold
- 4.4** Students are able to make and apply thermophilic (hot) compost and vermicompost (using worms) to process food waste as well as compost teas and extracts
- 4.5** Students are able to use a microscope to identify soil food web organisms and determine soil, compost, compost extract, and compost tea quality
- 4.6** Students are able to cultivate fresh, salt, and brackish water aquatic plants and animals in a small controlled environment as well as in a larger context
- 4.7** Students are able to design and install water harvesting and water management earthworks and water storage systems
- 4.8** Students are able to filter water in a variety of ways, including sand and charcoal filters, reedbeds and lagoons, mycoremediation, and phytoremediation to clean graywater and blackwater
- 4.9** Students are able to calculate the volume of precipitation, evaporation, moving water, and bodies of water
- 4.10** Students are able to design, install, and have experience repairing and maintaining a diversity of earthworks, ponds, and dams
- 4.11** Students are able to design, build, and have experience repairing and maintaining building structures using natural building methods
- 4.12** Students are able to identify and describe permaculture principles in business plans as well as design, present, and critique regenerative business plans
- 4.13** Students are able to design renewable energy solutions on a home scale, and have experience installing and maintaining /repairing renewable energy systems
- 4.14** Students have participated in regular acts of large-scale land restoration
- 4.15** Students have participated in regular acts of water and riparian restoration

5. Social & Self Skills

- 5.1** Students have participated in, planned, and helped manage many acts of service connecting natural principles to social principles – providing a minimum of 30 hours of community service

- 5.2 Students are able to identify, define, share, plan, promote, and participate in actions of compassion, empathy, and people care
- 5.3 Students are able to model nonviolent communication and restorative justice skills in everyday and conflict mediation settings

6. Self Smart Skills

- 6.1 Students are able to write out a life plan based on their holistic goals
- 6.2 Students are able to meditate for 20-50 minutes at a time
- 6.3 Students are able to maintain their physical health using exercise and stretching, like yoga, qigong, tai chi, calisthenics, jogging, and other forms of physical fitness activities, dance, sports, and/or martial arts
- 6.4 Students are able to develop healthy and balanced meal plans based on bioregionally and homestead or school garden sourced foods

Career Paths

College/University/Trade Schools/Internships

Since colleges, universities, internships, and trade schools have a wide range and broad diversity within them, I have not included standards for this level of education. Instead, these are general objectives and experiences related to a balanced professional educational experience that extends and builds upon the standards previously stated.

Learning Objectives & Experiences

- In-depth learning and hands-on, community-scale, and commercial-scale projects collaboratively planned, designed, and managed
- Immersion in professional contexts with experts
- Professional regenerative skill training and knowledge acquisition
- Professional community building skill training and event production
- Professional social & self smart skills

Current Standards Don't Lead to a Regenerative Future

Current standards are highly detailed and thoroughly iterative and repetitious. They attempt to cover every topic and subtopic possible deconstructing as far as is comprehensible into each topic area, so teachers can map out the entire year and still have standards and topics that require coverage – in other words, there's always sections of material that do not get covered. This leads to pacing guides made by districts to attempt to keep teachers and students on track for covering all the standards in a single academic year, but that creates an overall lack of depth in both teaching and student understanding – this makes sense to the outside observer: they ARE moving too fast, but it rarely occurs to those involved to stop this

process and make fundamental changes to the system. The more we cram for tests and the more we focus on minute standards, the less we can get a deep analytical understanding of a topic, skill, or concept. Our current standards lack the fundamental human drive of meaning. Lacking principles and ethics, the standards have no strong ethical foundation or direction for human progress – you learn this set of information because that’s how old you are and that’s what you’re taught at that age. The standards are uninspiring both to the student and the teacher. They do not focus on the student as a whole person, nor do they view education as a fluent holistic understanding of our world, but rather our current education standards focus on naming everything and memorizing as many names and their locations as possible – it is of the lowest two levels of cognition.

Today, you don’t get far by being just like everyone else – that’s the old system. Having the same answer and uniform performance is a factory education model, and in a world where automation, AI, and optimization are erasing jobs at an exponential rate (such that some are calling for a universal basic income), individuals with creative minds that can think critically are leading and innovating. College programs that once led to steady work, now lead to unemployment. It’s more important today than ever to know how to support yourself – it’s the job of K-12 education to prepare students for our world and economy. Our current standards are failing our students and leading them down a high stakes road to nowhere with no real life skills. If we are to prepare our students for both the future and the current economic, social, and environmental climate, they deserve and require the best tools, skills, and concepts to support them in this endeavor. These students are being asked to fix the neglect, damage, and degradation of thousands of years of human activity and to live in a new way that no one has fully adopted yet, and it is no doubt daunting to some degree, but the truth is they can be the heroes – this ball is in their hands but we have to prime and prepare them to run and make it across that finish line. We cannot do it without them – they are the future. We can put all the effort in but if they undo all our work when we age out, it was all for nothing. Our education system is the bridge to a stable, regenerative future if we can build it in time.

Another note on the separation of academic disciplines: if everything is separated out into parts of a whole and taught separately as if unrelated, how can we expect students to see how they interact, relate, rely upon each other, and form a complete whole system? After all, science is how we explain and make sense of our world and experiences, math is how we measure, calculate, and analyze aspects of those experiences, written and verbal communication and the arts are how we share our understanding, and history is the development of that understanding over time. Current schooling doesn’t embrace this cross-curricular concept nor can they by following current standards – while we have humanities (history+English) lurking in some people’s pasts, no one is taught holistically from a standards-based approach. This has to change if we want adults to think holistically and act on, rely upon, purchase, and vote for regenerative solutions to current threats to all global and local cultures, economies, and environments.

Many that see this book and don't pick it up will likely be of a specific "camp" – they'll be staked out and entrenched within a certain group, like NGSS, STEM, Environmental Literacy, or NSES. While each of these sets of standards has some validity and application, overall they are missing critical, fundamental components that would make their content engaging, empowering, regenerative, and authentic. They will undoubtedly all rely upon homework, worksheets, note taking, lecture-based instruction, and endless analysis.

Analysis paralysis makes sense when we look through the lens of K-12 education: you don't have to DO much of anything but be obedient and attentive, test well on verbal and math standards, and analyze endlessly using deconstructionism and critique (if you are lucky). Application, when it occurs, is inauthentic and does not build real-life skills, so the learning disconnects us from the natural world and the possibility of authentic learning itself. This leads to continued behavior of this sort as an adult, and we can see it especially in the adult environmental activist community and the environmental science standards: they can dissect everything that is wrong and perhaps even propose vague generalized plans for change, but they fail to make comprehensive change that goes viral in their own lives and thus their message is heard loud and clear: panic, be afraid, perhaps even be angry, but pass the message on, and wait for someone who knows what to do to take care of it all. It is a direct by-product of an education system that disempowers them and has them rely upon authority for answers and solutions. We are trained to analyze, to deconstruct, but not to act, to regenerate, and to steward wild ecosystems – that is what is lacking. While the current array of science standards have some merit, they lack understanding of how the world actually works: how science has evolved in the last 50 years and how to ethically manage our world and live our lives regeneratively.

Permaculture education standards don't necessarily displace any standards, but they do reinforce, clarify, support, inform, correct, extend, and demystify many standards in a variety of academic disciplines. The permaculture lens orders, prioritizes, and provides context for all standards, concepts, and education.

Next Generation Science Standards (NGSS)

*NGSS prove that our kids are capable of a great deal, but is it helpful?
Will all that information help them truly become citizen scientists, deflect
climate disaster, and voluntarily adopt regenerative solutions in their daily lives?*

To the Next Generation Science Standards, our world and universe is a Newtonian machine as is all life – that paradigm has been shattered by the science of the new century. The design of the NGSS standards is also disempowering, disconnecting, and focuses on technological, chemical, and engineered solutions with no focus on the intrinsic power of nature itself to heal, restore, and grow into an abundance when human activities are syntropic, partnering beneficially with natural cycles and patterns to perpetually generate new life. NGSS focuses on highly detailed but disconnected groupings of facts about and measurements of natural

systems. NGSS is also often out of alignment - tasks are expected but no skills or solutions were part of the standards leading up to those expectations: NGSS asks students to help biodiversity after a sustained focus on evolution in HS-LS4 – misaligning the standards to outcome. Students cannot design from a numerical analysis perspective nor from evolutionary principles. Regenerative principles support biodiversity and overall ecosystemic health, not evolutionary principles which often focus on stress and pressure over time. They need to know how nature actually works and how they can interact with it. In addition, to evaluate designs without any principles of design or regenerative designs to source, with no testing, is unscientific. To research published data in mainstream media, selected readings, and standardized textbooks and to use numerical analysis of cost-benefit to evaluate which climate change plans are best is a convoluted exercise in disempowerment – examining and analyzing something you'll never be able to prove, disprove, or access the actual data sets. NGSS also focuses on computer simulations of what can go wrong – essentially perpetuated the doomsday predictions instead of focusing on an array of what is possible and what students can do. NGSS doesn't lead to a brighter future, but it does perpetuate the myth that analysis, technology, and authority will save us. NGSS doesn't provide solutions or regenerative skill building though it does expect students to generate or already have them. I include the NGSS standards, as they are a touchstone from the past allowing us to see where we've been and still are, and because of where we are going, it is absolutely necessary for many to orient themselves first. The NGSS standards do cover important topics, concepts, and ideas, but they are out of proportion, missing information, and organized poorly and without an understanding of current educational best practices and how students can incorporate and apply the standards into daily life. The fact is, all the standards available to educators have been up until now lacking the critical ingredients of the permaculture ethics, natural principles, personal growth, being a part of something larger than ourselves, and radical new insights in mycology, soil science, the water and carbon cycles, renewable energy, social science, educational psychology, and so much more. The reality is that science is NOT separate from our reality, that EVERYTHING is part of nature, and that WE are active participants in the natural world and scientists in our own lives, for better or worse. Allowing children and people of all ages to take upon themselves the responsibility for their own existence on this planet is incredibly important for them as human beings.

We need to know how to live responsibly, how to apply the scientific method ethically to all aspects of life, and how to live in a way that makes the world a better place through our daily lives. It can't be an empty gesture like the NGSS engineering design section; it has to be the main focus and the purpose of formal education.

While the NGSS (Next Generation Science Standards) are very thorough from an outdated perspective of science, they are strictly Newtonian, lack a true understanding of DNA and genetic inheritance, omit quantum physics altogether, and they lack a cohesive holistic

connection to all other disciplines and all aspects of life, all of which tends to leave the learner feeling disconnected from the information. The detached nature of some academics finds its root in the detached nature of traditional education itself where in-depth learning leads to silos with their own secret language instead of deeper interconnections between disciplines. It turns the learner into a passive observer rather than an active participant. If we want active scientists, engaged regenerative stewards in local bioregions, and caring problem solvers, we need to train them in an empowering way: it must be active, engaging, and always linked to their world, micro to macro, in a meaningful, personal way.

There's a disempowerment of the learner when the focus begins with a look at the unseen and unverifiable world – the molecular and atomic ones. They are forced to take the teacher's word for it – the message is trust in authority instead of be curious and see for yourself. It is our job as educators to make natural cycles and scientific principles normal and understandable components of all aspects of daily life. Instead of starting with the molecular, it should start with the microscopic, in the verifiable, and allow them to do the actual work and see it for themselves. This relationship: micro to macro is key to building a strong scientific understanding of our natural world. Molecular, atomic, and quantum systems can be discussed, but the foundation should always be rooted in the verifiable and testing and application undertaken by the students themselves.

National Science Education Standards (NSES)

Similar to the NGSS offering, the National Science Education Standards lack ethics and a unifying foundation though they do have consistent unifying threads which are unquestioning faith in scientific authority, the scientific method, mathematical proofs, quantification, deconstructionism, reductionism, naming, and grouping. The NSES standards focus on creating the illusion of complete understanding and control over the natural world, which only deepens the disconnection between the students and the natural world and leads students and scientists to feel confident in outdated science and practice. Students need positive, beneficial interactions with real natural systems: micro to macro. NSES focuses, as NGSS does, initially on the molecular and atomic worlds – forcing students to learn based on their faith in their teachers, the textbooks, course materials, and their teacher's own faith in the topic instead of using scientific means to prove the concepts to the students or having the students prove the concepts themselves – this again is disempowering and creates learned helplessness and reliance on authority.

In classic science education fashion, NSES promotes the idea that scientists should be skeptical detectives or impartial observers instead of informed actors, caring, observant stewards, and passionate problem solvers working to serve people, the Earth, and the future holistically. The NSES standards continues the myth that humans and nature are separate. It does not clearly connect science to all other disciplines of academia and daily life. The NSES standards do not address climate change nor regenerative solutions.

Developing a Framework for Assessing Environmental Literacy (EL)

It must have been difficult creating the Environmental Literacy frameworks and assessments, given that the authors clearly are not environmentally literate and so have created an assessment that has no meaning because it is measuring something it cannot recognize or measure in a teaching and student population, as unacquainted with environmental literacy as they are. The NAAEE has been waiting for permaculture standards to provide the foundation for their frameworks and assessments. EL focuses on spreading awareness and having high expectations but without the scaffolding necessary for student success or accurate assessment of learning. NAAEE's focus on cognitive skills over hands-on, pragmatic, and professional skill building cheats students of the keys they'll need for regenerative success later on in life or currently in their home as well as robs the greater local community and even global collective of a myriad of holistic benefits.

It is clear the NAAEE Environmental Literacy assessment writers are very earnest in their desires to foment miraculous student breakthroughs through debate, study of accepted source materials (primarily mainstream media), and analysis of cost efficiency of different proposed technological solutions. It does not promote students sequestering carbon in massive amounts through student-led & designed bioregional projects restoring wildlife habitat, watersheds, riparian areas, wetlands, coastal regions, and more. These are simple things, but the NAAEE doesn't even approach them, nor does the NGSS.

Assessments of environmental literacy should be authentic, project-based, and regenerative. They should be bioregional and based on permaculture skills, strategies, principles, ethics, and standards. What the NAAEE and the NGSS need is a clear set of standards and fluency in natural systems and principles – that is what is found in this book and the companion textbook and workbook.

If we are to create a resilient, ethical, and regenerative culture, it begins with an education based on those concepts and focused on teaching those skills. It's time science education matures and becomes the lynchpin for all education through the permaculture lens.

About the Matt Powers

Matt Powers is a teacher, author, seed saver, plant breeder, and family guy who teaches people all over the world how to live more regeneratively, so they can have a more abundant and regenerative today and tomorrow through over a dozen published books, five online courses, curriculum, and speaking. Over the course of a decade and with a masters degree in Education, Matt went from teaching at a private music school to teaching high school students to teaching high school teachers and administrators to teaching districts and speaking at universities and conferences all over America and online, teaching permaculture and sustainable, regenerative skills and thinking. Matt provides daily inspirational and regenerative content online and is one of the most-followed permaculture teachers online with over 27,000 Twitter followers and tens of thousands of followers in his many Facebook groups and pages ranging in topics from permaculture education to entrepreneurship to gardening to fungi & more.