

# Education Foundations for the 22nd Century

Children starting school today will live into the next century. The conditions shaping their worlds will continue to evolve as they graduate, work, and raise their own families. Research from institutions such as Ipsos, UNICEF, Deloitte, and Edelman points to growing uncertainty among young people, marked by declining confidence in the future, reduced trust in leadership, and rising anxiety linked to feeling unprepared for what lies ahead. Anger and withdrawal have become common responses, along with increased susceptibility to simplified explanations and short-term, self-preserving positions.

When people feel cornered, they look for causes and focus on identifying perceived sources of threat. In a complex and rapidly changing world, multiple explanations are presented across political, ideological, and identity-based lines, each offering a different account of what is wrong and what should be done. Understanding how these explanations form and how to assess them becomes central. Developing the knowledge, skills, and experience to investigate causes and evaluate competing claims can make it possible to navigate shared challenges together.

Two challenges are converging at this moment of epochal change. The first is the over-success of the human species. Over thousands of years, human systems have become increasingly effective at expansion, extraction, coordination, and environmental modification, eventually reaching planetary scale. The second challenge is the gradual loss of the regenerative capacities, relationships, and forms of agency that historically helped mitigate the destabilizing effects of this success through long-term ecological planning, cooperative organization, intergenerational learning, and adaptive resource management across many societies.

Together, these challenges can be addressed through what may be called the regeneration transition. The regeneration transition builds upon regenerative knowledge systems, social technologies, and ecological practices developed across thousands of years, while also requiring movement across the thresholds of disconnection that increasingly separate individuals and communities from the conditions that support long-term thriving. These thresholds limit the ability to express many of our source-evolved capacities and attributes, including ecological observation, cooperation, multigenerational learning, conflict navigation, and meaningful participation within community life.

The regeneration transition is therefore not simply an environmental project or social reform movement. It does not reject human development, technology, ambition, or complexity. Rather, it represents a different understanding of them. Regenerative systems recognized that all environments contain carrying capacity limits, that unchecked expansion generates instability and conflict, and that long-term thriving depends upon maintaining the conditions that allow life to regenerate across generations.

This requires both resource management and a relational understanding of self, community, environment, and human agency to develop interconnected ecological, social, and economic systems. Human beings evolved as exploratory, competitive, symbolic, and social organisms.

Regenerative systems therefore cannot depend on suppressing human drives or imposing permanent restraint. Instead, they must seek to organize ambition, innovation, competition, and social complexity within systems capable of sustaining continuity over time.

Regeneration transitions represent one of the most advanced stages of human social and technological development because it attempts to organize conflicting human systems within the realities of interdependence, ecological limits, and long-term continuity. As a foundational educational element for the 22nd century, the study of regeneration transitions can develop the capacities needed to understand and participate within the regenerative processes that sustain life across generations, providing students with a wider relational understanding of self, community, environment, and human agency. It can inform and guide learning across all disciplines, across and between communities as a universal goal.

Over the past 25 years, I have developed and researched a learning framework designed to teach regeneration transitions as a foundational curricula across a range of educational settings. The framework's three learning domains are structured as a knowledge system and set of learned skills readily integrated across disciplines and age groups. Drawn from established pedagogical practices and field-tested with international teams of educators across diverse contexts, the delivered knowledge, skills, and experiences are intended to build the competence, confidence, and cooperation needed to address the challenges of our time.

## **The Current Landscape**

Parents, teachers, and education systems determine how the next generation learns, what is taught, and how it is taught. State education systems are largely designed within economic frameworks, aligning learning with labor markets, productivity, security, and social stability. This has been intensified by the "PISA shock," where OECD rankings act as a limited compass, pushing governments to prioritize benchmarking and standardized testing as measures of success. In this climate, education is often treated as an investment in human capital.

Organizations such as UNESCO offer a broader vision, framing education as a human right aimed at personal development and global peace. Alternative models from Montessori, Steiner, Dewey, and Freire augment this vision, cultivating creativity, experiential learning, democratic participation, and the development of the whole person. These innovations continue to influence reforms across systems.

Nature-based education is a pedagogical approach that has, in its contemporary form, expanded over the past two decades, influenced in part by Richard Louv's description of "nature-deficit disorder" and the documented effects of disconnection from the natural world. Regeneration transitions education programs have been developed through our teaching team's experiences in this educational field working with schools and home schooled groups around the world, designing and teaching programs grounded in deep nature connection. This work has focused on observation, tracking, ecological literacy, and place-based awareness. These approaches improve mental health, attention, and cognitive development while fostering a sense of belonging within the living world.

Despite these important pedagogical developments over the last two hundred years, most educational innovations continue to operate within systems whose primary structures remain aligned with short-term economic priorities and fragmented institutional goals. Nature connection, creativity, wellbeing, democratic participation, and academic achievement are frequently treated as separate educational objectives rather than as interconnected capacities required for long-term social and ecological continuity.

Nature connection programs in particular are often incorporated as supplementary activities that support student wellbeing while remaining disconnected from the broader developmental direction of education systems. Their deeper significance as foundational learning capacities connected to regenerative economic systems, intergenerational continuity, and long-term human thriving remains largely unexplored.

The balance between preparing students for success in existing economic and social systems whilst taking care of their developmental, emotional, and creative needs achieves varying degrees of success limited by the lack of a cohesive narrative and goal. Goals are often contradictory and confusing for students: meeting their immediate needs within a continuous growth economy whilst managing their long-term viability within the carrying capacities of land and living systems. Immediate economic needs ultimately take priority and nature connection programs become emotional regulators and relaxation and recreation activities. Unpacking the full potential of the teachings and practice of deep nature connection, however, can offer much more.

The nature connection education movement emerges from Indigenous learning systems and the work of Indigenous educators who have brought these approaches into mainstream systems. It represents a return to core evolved practices, developed as technologies to support regenerative economic and social systems that have been created around the world over thousands of years.

In integrated Indigenous regenerative economic systems, learning is embedded in ongoing relationships between people, place, and community. Knowledge, practice, and responsibility are carried across generations, linking immediate experience with long-term continuity. Nature connection in this context is not a discrete activity, but part of a broader system of learning directed toward a specific economic system and social goal.

Nature education and deep nature connection skills and practice enter mainstream education systems as grafted branches that enrich students' lives yet leave them more aware of their disconnection from living systems. They learn to love and cherish what they are obliged to destroy and fight to sustain.

To realize the potential of nature connection education requires understanding its progeny as part of a triad of foundational survival tools, its role along with prosocial and universal connection as technologies that developed regenerative economic systems over thousands of years, and its present status as both an ancient Indigenous functional identity and a novel addition to dominant mainstream education practices.

An expanded nature connection curricula at the foundation of education systems can integrate learning and outcomes across communities and deep time, providing a greater range of opportunities and responses to emerge as students connect their skills, knowledge, and experience across disciplines toward their long-term thriving goals.

Respected education theory supports the insertion of these curricula foundations at the roots of contemporary education systems. Established theories on the evolution of education, learning and intelligence, and communication and scaffolding systems deliver solid curricula foundations based on seminal research and validated practice. The following examination explores these theoretical and best practice foundational curricula elements and how they can be inserted at the foundations of 21st-century education models to fulfil 22nd-century goals.

## **The Learning Tree and Education Systems**

Learning and education systems can be understood as a tree and a building. Adding new activities or redesigning classroom practices can be valuable, but these changes have limited effect when the foundations and roots of the system are misaligned with their goals.

An evolutionary exploration of education systems and the conditions that shaped human learning show how both the substrate and goal together direct the growth of the education tree through the process of natural selection. Human capacities developed in response to environmental conditions, and learning systems emerged as ways of sustaining successful interaction with those conditions over time.

Natural selection pursues survival in species past adulthood and thriving across generations. A thriving goal that ignores immediate survival results in short term demise, while short-term survival without intergenerational continuity leads to end-game collapse.

The relationship between different types of knowledge acquisition as survival and thriving mechanisms was described by cognitive developmental and evolutionary psychologist David Geary's as biologically primary and biologically secondary learning. Biologically primary learning includes capacities that humans evolved to acquire naturally through interaction with their environments and social groups, such as language, social communication, spatial awareness, and environmental tracking. These forms of learning develop with minimal formal instruction because they are supported by evolved cognitive systems.

Biologically secondary learning, in contrast, includes culturally developed skills such as reading, writing, formal mathematics, and abstract symbolic reasoning. These forms of knowledge do not arise spontaneously and require structured teaching and sustained effort. They are built on top of biologically primary systems, drawing from them but not emerging directly from them.

Learning that is grounded in primary systems, through observation, interaction, and participation, tends to be more intuitive and cognitively efficient. Learning that is abstracted from these systems increases cognitive load and requires more explicit instructional support. Effective education foundations depends on how secondary knowledge is connected back to

primary capacities, allowing learners to move between direct experience and symbolic understanding. The integration of experiential and cognitive approaches to learning provides two pathways toward mastery.

Experiential learning engages biologically primary systems through direct interaction with environments, social groups, and real-world conditions. Cognitive or narrative learning develops biologically secondary systems by organizing experience into concepts, models, and knowledge structures. Both are necessary. Without experiential grounding, knowledge becomes abstract and disconnected. Without cognitive development, experience remains local and unintegrated.

This is true across the three foundational domains of learning, nature connection, prosocial connection, and universal connection. Nature connection engages primary and secondary capacities through observation, tracking, and pattern recognition, ecological knowledge development, economic systems thinking and living needs provision. Prosocial connection utilizes both learning capacities building cooperation and communication skills, understandings of governance, institutions, and collective organization. Universal connection engages these biological mechanisms to develop meaning-making and pattern recognition, scientific reasoning, philosophical inquiry, and symbolic interpretation.

Learning within these domains therefore involves an ongoing movement between primary and secondary systems, between experience and abstraction, between direct engagement and conceptual understanding.

The role of elders as educators evolved as a central organizing element. Anthropologist Kristen Hawkes' grandmother hypothesis suggests that extended human lifespans beyond reproductive years contributed to the development of knowledge systems that extend across generations. Elders supported group survival not only through care and provisioning, but as master practitioners able to pass on the skills and knowledge that sustain economic and social systems beyond their lifetimes. The two-way nature of education as a student teacher relationship provides a mechanism where Elders can pass on time tested mastered skills and knowledge and youth can creatively engage with these teachings responding to changing conditions. Education systems evolved to balance vision and adaptation naturally selected for generational survival and intergenerational thriving.

Humans evolved as lifelong prosocial learners. Narrative and experiential learning paths connect us to our living environments through a tracking process of input, analysis, decision and response. Fed by our senses and cognitive capacities as individuals and groups, student and teacher, our combinations of intelligences process data through decision making toward effective action.

The evolutionary framework of survival and thriving finds a clear cognitive blueprint in Robert Sternberg's Triarchic Theory of Intelligence, which maps the internal mechanisms through which humans process the world. If the learning tree is rooted in biologically primary systems and reaches toward secondary symbolic knowledge, then Sternberg's three

intelligences—analytical, creative, and practical—act as the metabolic processes that convert environmental input into effective action.

Analytical intelligence, or componential ability, functions as a primary tool for processing biologically secondary knowledge. This is the engine of abstract reasoning that allows a learner to dissect, compare, and evaluate the symbolic models found in formal mathematics or scientific inquiry. Within the context of the learning tree, analytical intelligence ensures that the concepts and models of the cognitive path are internally consistent and logically sound.

To prevent this knowledge from becoming abstract or disconnected, it must be balanced by practical intelligence. This contextual ability is deeply rooted in our biologically primary systems and represents the street smarts required to navigate social and natural environments. Practical intelligence allows a learner to apply internal models to real-world conditions, acting as the intelligence of the master practitioner who can adapt to, shape, or select environments that sustain both the individual and the group.

Connecting these is creative intelligence, the experiential bridge that allows humans to handle novelty. Just as the learning tree must adapt to changing environmental conditions to ensure intergenerational thriving, creative intelligence allows the learner to move beyond existing patterns to discover new solutions. It is through this creative capacity that youth engage with the time-tested teachings of elders, ensuring that the education system remains an adaptive force rather than a static relic.

These three intelligences, present in different ratios in each person, are developed through lived experience across ecological, social, and knowledge systems. Wisdom, emerging from accumulated relational intelligence, is modeled by elders and stewards who guide learners through the ethical complexities of real-world experience. Sternberg's theory provides a model for education systems to realign along three learning domains, follow two learning paths, and use all human intelligences guided by a compass toward a common, well-considered goal.

The alignment of evolutionary theories on education requires a cohesive narrative that links these biological foundations to the development of our modern economic and educational systems. While human capacities for analytical, creative, and practical intelligence evolved to ensure survival and thriving, the current relationship between our institutions and these innate abilities is often characterized by fragmentation. By examining how economic systems have shaped educational priorities, we can identify the potential for a deeper realignment that honors both our evolutionary heritage and our future needs. This transition from individual cognitive processing to global systemic awareness is explored through a universal lens that situates human development within the larger story of our planet and its history.

## **A Universal Narrative**

Designing education foundations with a long-term, systems-level perspective reveals the shared challenges arising from the relationship between economic, environmental, and education systems, and how their alignment shapes the possibilities for a thriving future. A universal perspective applied across space and time frees us from myopic solutions and increases opportunities for success.

The "Overview Effect" experienced by astronauts offers a physical bird's-eye view of Earth as a finite, interconnected system within a vast universe. A parallel can be imagined as a narrative bird's-eye view of time, tracing the emergence, present state, and future trajectory of our species. Seeing Earth from above and time from a distance links the human story to the life-sustaining planet that is our home.

A compass accompanies these two maps, a cognitive and sensory tool connecting physical experience and conceptual narrative. These maps, together with a seven-direction compass, scaffold the construction of a 22nd-century education model as students develop skills along both experiential and narrative learning paths. The compass points to four cardinal directions on a horizontal plane and three directions, up, down, and centre, on a vertical plane. These directions describe the physical world with the centre as community and the cognitive world with the centre as self. In this way, the union of self and community becomes the point from which learning paths emerge and are understood in relation to each other. The compass is a gift adapted from Indigenous technologies. Used together, these tools guide learners through a universal perspective toward a shared goal.

## **Epochal Change**

An effective education foundation requires an understanding of stability and change, how human societies develop over time, and how those developments relate to economic needs and environmental conditions. Human societies move between periods of relative stability and periods of significant change. Viewed across the long river of human history, three major periods of epochal change stand out: the end of the Miocene, the Pleistocene, and the Holocene.

An epoch is a major division of geological time, marked by shifts in climate, life systems, and planetary conditions. As forests gave way to grasslands during the Late Miocene, early human ancestors adapted through upright walking. During the Pleistocene's fluctuating ice ages, survival required flexibility, driving the evolution of larger brains, tool use, and social cooperation in *Homo sapiens*. The Holocene's more stable climate allowed intensified land management and the development of locally adapted food systems. We are now living through a further epochal transition, the Anthropocene.

The Anthropocene describes a measurable shift in which human activity has reached a scale that alters climate systems, ecosystems, and atmospheric chemistry. These changes are visible in ice cores, sediment layers, and atmospheric records. This is a change in scale rather than a

break in process. Human systems have expanded to the point where their cumulative impact shapes life on Earth.

## **Tracking the Anthropocene along the River System of Human Time**

James C. Scott uses the term Thin Anthropocene to describe a long phase of human environmental influence beginning over a million years ago with early hominins such as *Homo erectus*. Humans shaped environments through fire, hunting, and tool use, while living in low-density populations across large landscapes.

By around 100,000 years ago, *Homo sapiens* had evolved and developed capacities that remain central today, including advanced tracking, language, social coordination, and planning across time. These competitive advantages allowed for improved technologies and population growth. Human impact intensified. Large prey species declined in many regions, including megafauna such as mammoths in Eurasia and giant marsupials in Australia. The Thin Anthropocene thickened.

The transition into the Holocene provided new challenges and opportunities. Stable climates allowed new forms of settlement and resource use. Social structures previously balanced around big game hunting gave way to less egalitarian structures. In certain regions, grain-based agriculture developed, introducing a different form of economic organization. Grain can be stored, measured, and redistributed, supporting population growth and coordination across larger groups. Surplus could be collected and controlled, supporting administrative systems, standing armies, and early urban settlements.

Over time, these systems developed into stratified societies with organized control over land and production. They expanded through trade, storage, and territorial extension, forming the basis of large-scale economic and political systems that continue today.

Alongside this expanding stream, other pathways developed. These regenerative systems organized around continuity within living systems rather than accumulation. They built on ecological awareness, memory of place, cooperation, and pattern recognition. Societal structures were rebalanced around smaller game hunting, horticulture, and animal domestication.

In regions where expansion was limited, regenerative systems developed as adaptive responses. These included practices such as controlled burning in Australian Aboriginal land management, polyculture systems in Amazonian regions, and long-term forest stewardship among Pacific Northwest societies. These approaches allowed societies to maintain productivity over time without reliance on continued expansion.

# Convergence in the Anthropocene

Over generations, these systems supported continuity within ecological limits for thousands of years. The knowledge carried within them remains present today, often described as Indigenous Knowledge Systems and Indigenous Technical Knowledge. These living systems continue to develop through engagement with environments, communities, and sovereignty loss.

Within expanding systems, movements of reconnection have continuously mitigated excesses. These appear as spiritual traditions, philosophical systems, and social movements that seek to restore relationship, balance, and long-term continuity.

Today, the expanding and regenerative streams meet within the Anthropocene. Both now share the reality of a planetary context where ecological limits, social organization, and knowledge systems impact all systems.

## Three Learning Domains

At this convergence, a set of education foundations can be identified on which to build an education system fit for the 22nd century. A starting point is the growing recognition of the value of nature connection as a foundation for learning. Yet this raises a prior question: what is the goal of that connection?

In Indigenous learning systems, nature connection is not an isolated experience or a developmental tool. It is part of a multigenerational relationship between communities and the territories they inhabit. Knowledge, practice, and responsibility are carried across generations, allowing societies to maintain continuity within living systems over long periods of time. This introduces a different educational horizon, one that extends beyond individual development toward long-term participation in regenerative relationships.

From this perspective, a second question becomes unavoidable. How are human relationships organized within and around these systems? Regenerative lifeways are not free from competition, conflict, or differences in status. They depend on the ongoing organization of collective life. This brings into focus the need to understand how cooperation is structured, how conflict is navigated, and how shared resources are sustained. Education must therefore develop the capacities required to participate in prosocial systems under real conditions, not idealized ones.

A third question follows. How do humans interpret and act within complex and uncertain worlds? Across both Indigenous and scientific traditions, knowledge is developed through processes of observation, testing, and interpretation, yet no system provides complete certainty. Humans must continually navigate the unknown, including the limits of knowledge, the risks of overconfidence, and the consequences of error. Education must therefore include the ability to

work across knowledge systems, to hold different forms of understanding in relation, and to engage uncertainty without collapsing into fixed narratives or ungrounded claims.

Seen in this way, the challenge is not to continue an open-ended sequence of educational reforms, each responding to perceived shortcomings in the last. It is to recognize that education has moved through phases of disconnection from the conditions that shaped human development, and that these can be named and addressed. The task is not to pursue progress as an abstract goal, but to re-establish the capacities that allow humans to remain connected to ecological systems, to sustain collective life, and to orient knowledge within a shared reality.

From this foundation, three domains of learning emerge as necessary. Building on a nature connection-first approach, these domains extend it to address the realities of epochal change. Within Sternberg's framework, they provide the contexts in which analytical, creative, and practical intelligences are developed and directed through the guiding role of wisdom. They engage directly with the realities of human competition, status, and conflict, and with how these can be understood and organized within prosocial systems. They also address the relationship between knowledge systems, narrative, and the unknown, creating the basis for moving beyond narrative conflict toward a more integrated, universe-referent identity.

The first domain, Nature Connection and Earth Regeneration, develops the capacities through which humans understand and work within living systems, building on sensory awareness, tracking, and pattern recognition. Grounded in direct engagement with land, seasons, and ecological processes, this domain reconnects learning to the conditions within which human cognition and social systems evolved.

It extends from experience into practice. Regenerative systems depend on the ability to observe, interpret, and respond to ecological limits over time. This includes understanding carrying capacities, cycles of renewal, and the long-term consequences of human activity. In this way, nature connection becomes not only a foundation for learning, but a basis for sustained participation in living systems across generations. This is reflected in contemporary frameworks such as Kate Raworth's doughnut economics, which defines a space for human activity within ecological limits.

This grounding in living systems supports long-term continuity. However, ecological understanding alone is not sufficient to sustain human systems over time. Humans do not operate as isolated observers within nature. They live in groups, where differences in needs, perspectives, status, and power shape how decisions are made and resources are used.

Even within regenerative systems, these dynamics do not disappear. They must be continually navigated. Cooperation is not automatic, and conflict is not absent. Both are part of human social life.

This leads to a second requirement for education. If individuals are to participate in regenerative systems, they must also be able to organize and sustain collective life under real conditions.

This includes working with difference, managing shared resources, and responding to competition and conflict without destabilizing the system itself.

Prosocial Connection and Community Regeneration develops the capacities through which humans organize and sustain collective life, including cooperation, shared responsibility, and group decision-making. This domain includes the study and practice of how prosocial systems are organized in real contexts, including work such as Elinor Ostrom's research on commons governance, which demonstrates how groups can manage shared resources while navigating competition, status, and conflict.

However, even well-structured systems encounter limits. Decisions about resources, priorities, and responses to change depend not only on social organization, but on how situations are understood and interpreted.

Different individuals and groups draw on different forms of knowledge, experience, and belief when making sense of the world. These differences shape perception, influence judgment, and can lead to alignment or conflict. In complex systems, there is rarely a single, complete account of what is happening. Uncertainty remains.

This introduces a further requirement. If individuals are to participate effectively in collective systems, they must also be able to work with multiple forms of knowledge, to evaluate claims, and to navigate uncertainty without defaulting to fixed or simplified narratives. They must be able to relate to the limits of their own understanding, as well as to the perspectives of others.

The third domain is Universal Connection and Human Regeneration. This domain develops the capacities through which humans interpret experience, construct knowledge systems, and relate to the unknown. It builds on the source-evolved ability to track patterns of meaning, connecting observation, narrative, and explanation.

Within this domain, learning develops the ability to work across knowledge systems, including hypothetico-deductive scientific and Indigenous scientific approaches. It supports the recognition that different knowledge traditions offer distinct insights into shared reality and can be brought into relationship without reducing one to another, as described by Elder Albert Marshall's Two-Eyed Seeing approach.

## **Rebuilding the Foundations of Learning**

Together, these three domains establish a foundation that reflects the full movement of the river system of human time. They bring forward capacities formed in early human environments, developed through different economic and social pathways, and now required to engage with the scale of the Anthropocene.

Placed within education systems, these domains function as foundational structures rather than additional subjects. They begin in early learning and continue across all stages of education. They shape how subjects are taught, how knowledge is connected, and how learning is applied.

This shifts the purpose of education. It moves from preparing students for participation within assumed economic trajectories to preparing them to understand and work within changing realities. It develops the capacity to engage with ecological limits, sustain prosocial systems, and apply knowledge across contexts with clarity and continuity.

The realities of the Anthropocene are established through scientific observation, historical development, and lived experience. Aligning education with these realities follows directly from that evidence. Directing learning toward participation in emerging regenerative systems connects ecological understanding, collective organization, and the ability to navigate knowledge and uncertainty within a shared context.

From this foundation, education prepares learners not only to navigate change, but to participate in shaping the systems that emerge from it. In doing so, it develops analytical, creative, and practical intelligences guided by wisdom toward outcomes that can be sustained across generations.