

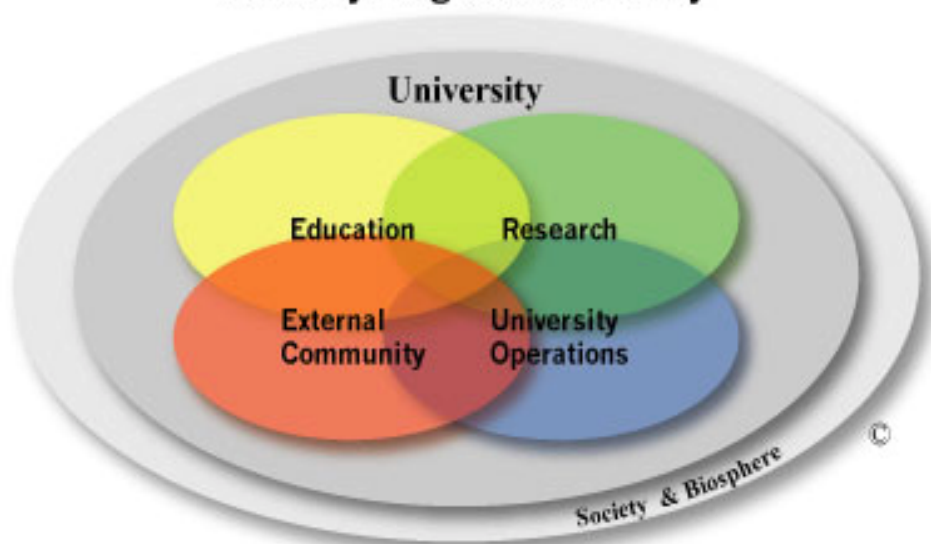
LEARNING PRINCIPLES FOR SUSTAINABILITY
Sustainability Curriculum Framework for Curriculum Development
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The following framework outlines critical themes to address when developing curricula and learning experiences for sustainability. The framework is based on a systemic perspective of the four main dimensions of sustainability:

- The health of all current and future humans and other species
- The fairness, equity, stability and security of human cultures and social systems
- Economic opportunity for all current and future humans
- Ecological diversity and integrity

Each theme, followed by specific examples, emphasizes one key aspect of Second Nature's vision of sustainability. This tool is designed to simplify the complex process of making sustainability a foundation of higher education learning and practice. By breaking down sustainability into its essential (but inseparable) components, we hope the framework provides content to guide each educator's unique teaching process. The framework emerged through an evolving process. Your comments on its usefulness, as well as suggested improvements, are both welcome and strongly encouraged.

**Higher Education Modeling Sustainability
as a Fully Integrated Community**



Sustainability Themes

1. Systems Thinking and Analysis

- systems dynamics
- “The Natural Step Framework”*
- structure, patterns and relationships; deep cause/effect relationships; upstream thinking; non-linear dynamics; feedback; system momentum; leverage and tipping points

2. Human Connections to the Physical and Natural Worlds

- understanding humans are a part of nature
- understanding that humans can and must live in harmony with natural systems
- the positive and negative effects of the physical, i.e. built environment, and the natural environment on human health and well-being
- the relationship of population, consumption, technology and carrying capacity to the biosphere
- $I = P \times A \times T$
(I=environmental impact; P=population; A=affluence/consumption; T=technology)
- making *invisible* health, social, economic and environmental impacts *visible*

3. Ethics and Values

- issues of equity, justice, culture, ethics and values and sustainability
- intragenerational and intergenerational impacts and equity of human actions
- different ways of measuring societal well-being (example: the concepts of qualitative change (*development*) and quantitative change (*growth*))
- individual and community improvement as integral components of economic, social and human development
- methods of individual, institutional and societal decision-making (example: cost/benefit analysis, the precautionary principle as well as ideas of scientific certainty and uncertainty)
- clarity in assumptions behind individual, institutional and societal decision-making and the current educational disciplines

4. How Natural Systems Function

- natural laws that govern the functioning of the biosphere
- interdependence and holism, e.g., if part of the system is sick, what is the effect on the whole system?
- functioning of natural systems in cyclical and renewable ways through renewable energy and complete cycling of all nutrients and wastes
- ecosystems as communities with hierarchies of relationships
- partnership, cooperation and competition
- resilience, redundancy, self-organization, self-regulation and evolution
- natural systems’ ability to maintain their own viability and sustainability

5. Technological and Economic Relationships to Sustainability

- technical, scientific and institutional strategies that foster sustainable development

- high energy and natural resource efficiency and conservation
- shifting from nonrenewable resources (e.g., fossil fuels, heavy metals) to renewable resources
- “biomimicry” - technology that mirrors and mimics natural systems (e.g., all waste is the raw material or nutrient for other species)
- using renewable resources at a rate that is less than or equal to the rate of regeneration (living off nature’s *income*, instead of its *capital*)
- design for sustainability, industrial ecology and ecologically sustainable design
- new business models based on the value added through the services not consumption of products; and through durability, repairability and recyclability of products
- remediation and restoration of ecosystems and preservation of biological diversity

6. Motivating Behavior for a Sustainable Human Society

- individual, cultural, social, legal, governmental and frameworks for fostering sustainability
- the relationships of population, consumption, culture, social equity and the environment
- micro-economic signals (i.e. prices or taxes) that foster sustainable/unsustainable action
- macro-economic measures that measure true well-being (e.g., moving beyond Gross Domestic Product to measures like the Genuine Progress Indicator)
- how spiritual and cultural beliefs affect humanly and environmentally sustainable behavior

7. Scale

- *chronological* – the immediate to intergenerational effects of human activity
- *spatial* – the local to global effects of human activities (e.g., the full impacts of economic globalization;)
- *size* – the scale of human activities relative to the ability of humans and the rest of nature to remain healthy and sustainable indefinitely

8. Pedagogical Strategies for Making Sustainability a Foundation of Learning & Practice

- *the content of learning* will reflect interdisciplinary systems thinking, dynamics and analysis for all majors, disciplines and professional degrees - education would have the same *lateral rigor* across, as the *vertical rigor* within, the disciplines
- *the context of learning* will be to make human/environment interdependence, values and ethics a seamless and central part of teaching of all the disciplines, rather than isolated as a special course or module in programs for specialists; making all *invisible and visible* health, social, economic and environmental impacts *visible*.
- *the process of education* will emphasize active, experiential, inquiry based learning and real-world problem solving *on the campus* and *in the larger community*
- *institutional practice of sustainability* in operations, facilities, purchasing, transportation and investments with full involvement by faculty and students
- *partnerships with local and regional communities* to help make them healthy, socially vibrant, economically secure and environmentally sustainable as an integral part of higher education’s mission and the student experience

* See www.naturalstep.org for details on The Natural Step Framework for sustainability