EDUCATION FOR A SUSTAINABLE FUTURE

BENCHMARKS

FOR INDVIDUAL AND SOCIAL LEARNING

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Education for a Sustainable Future
Benchmarks for Individual and Social Learning

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Education for a Sustainable Future
Benchmarks for Individual and Social Learning

The Process

The Essential question these EfS Benchmarks were developed to address is: *What are the essential elements of Education for Sustainability?* Forty-two authors contributed data to the project through the Journal for Sustainability Education, and thirteen of us conducted a meta-analysis of the data we collected using the Grounded Theory (GT) Methodology (a systematic methodology in the social sciences involving the construction of theory through the analysis of data). As researchers reviewed the data collected, repeated ideas, concepts and elements became apparent, and were tagged with *codes*, which were extracted from the data. As more data was re-reviewed, codes were grouped into concepts, and then into categories. Dr. Jerry Lieberman, State Environmental Education Roundtable, Jaimie Cloud, The Cloud Institute for Sustainability Education, and Darcy Hitchcock, Dragonfly Fund designed the protocols for the process. Darcy Hitchcock facilitated it, and the team that conducted it included:

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Early feedback is requested on this framework before June 1, 2016. Reviewers may comment directly on the PDF, and send feedback to Jaimie Cloud at jaimie@cloudinstitute.org. Include "feedback on EfS benchmarks" in the subject line. In fall, 2016, the Journal of Sustainability Facebook page and website (www.susted.org) will host space for additional feedback, with the goal of reporting on this iteration in the Winter JSE edition, "Future-Casting Sustainability Learning."

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Introduction

Why educate for sustainability? The unique challenges that define our era—reversing global climate change, protecting biodiversity, restoring the health of our oceans, developing sustainable food systems, accelerating the shift toward clean, renewable energy—**require fundamentally new ways of thinking and acting** (Capra, 2007; Rockström, 2009; AAAS, 2001; Barstow & Geary, 2002; Larson, 2011; NRC, 2012; NOAA, 2005 and 2009). Our species' endeavor to achieve a sustainable human future invites reflection on the fundamental question: Education for what purpose? (Orr, 1991 and 2004; Sterling 2001). If humanity is to successfully transition from an unsustainable way of life to a regenerative one, the field of Education for Sustainability (EfS) has a central role to play (Wheeler and Byrne, 2004; DOE, 2011; Assadourian and Renner, 2012; Sterling, 2001; Senge, et al., 2008 and 2012).

Education for Sustainability functions as a powerful rationale for teaching and learning in the 21st Century (Sterling, 2001; Wheeler and Byrne, 2004; Cloud, 2010). It is a "whole system of inquiry" that combines current best practices of teaching and learning with the content, core competencies, and habits of mind required for students to actively participate in creating a sustainable future (Bergstrom, 2009; Cloud, 2010; ESA, 2012). It can be defined as a transformative learning process that equips students, teachers, schools, and informal educators with the knowledge and ways of thinking that society needs to achieve economic prosperity and responsible citizenship while restoring the health of the living systems upon which our lives depend (Cloud, 2004 and 2010).

Education for Sustainability explicitly recognizes the role of teaching and learning in shaping the future we want. In this context, sustainability is viewed as a preferred condition: "A society that is far-seeing enough, flexible enough, and wise enough not to undermine either its physical or its social systems of support" (Meadows, 1992), "a quality of life for all within the means of nature" (Wackernagel, 1995), "the long-term integrity of the biosphere and human well-being" (Chapin et al, 2011), and "The possibility that human and other life will flourish on Earth forever" (Ehrenfeld, 2008).

From a theoretical standpoint, Education for Sustainability draws on multiple teaching and learning methodologies. These include backwards design, best known as "Understanding by Design (UBD)" (McTighe and Wiggins, 2004), curriculum mapping tools (Jacobs, 2004), learner centered/assessment driven instruction (Martin-Kniep, 2009), project-based learning (Buck Institute, 2003), inquiry-based learning (Bruner, 1996), constructivist learning (Von Glasersfeld, 1995), and professional learning communities (DeFore and Eaker, 1998). EfS provides teachers and learners with an inspiring mission—to participate in creating a sustainable future—and pedagogical and content pathways that support whole systems thinking and design. This truly represents one of the "grand challenges" of our time.

Key research informing an EfS theory of change includes, Organizational Learning and Change (Senge), System Dynamics and Systems Thinking (Von Bertallanffy, Ackoff, Capra, Forester), the Innovation Diffusion Theory (Rogers), and Otto Scharmer's Theory U.

EfS recognizes the essential role that interdisciplinary and cross-sector collaboration play in fostering innovation (Beinhocker, 2006). Education for sustainability is inherently transdisciplinary (NSF SEES, 2012). It assumes that comprehensive, anticipatory design solutions (Gabel, 2012) are required for systemic change. Robert Kates, author of *What Kind of Science is Sustainability Science?*, writes that "sustainability science is a different kind of science . . . with significant fundamental and applied knowledge components, and a commitment to moving such knowledge into societal action (Kates, 2011). Among the many disciplines and fields that inform EfS are:

- **Science:** adaptive systems, biology, Earth system science, ecology, environmental science, game theory, global environmental change, green chemistry, neuroscience, oceanography, , physics, resilience science.
- **Engineering & Design:** biomimicry, cradle-to-cradle design and manufacturing, ecological design and architecture, life cycle analysis with full cost accounting, and sustainable communities design.
- **Education**: climate literacy, ecological literacy, environmental education, design thinking, futures studies, holistic education, gaming to learn, geospatial literacy, global education, holistic education, mindfulness education, oceans literacy, place-based education, social emotional learning, systems thinking, and win-win conflict resolution education.
- **Social Science & Humanities**: creativity and the arts, ecological psychology, ethics, history and environmental history, philosophy, positive psychology, and the science of happiness.

Currently, there is a large gap between society's aspirations for a healthy and sustainable future, and the knowledge, skills, and attitudes being taught and acquired in the majority of Pre-K-12 schools. A long-term goal of the field of Education for Sustainability is to demonstrate the unique value of sustainability as a context for the whole school and curriculum (Stone, 2010), and for the larger community (Sobel, 2004; OFSTED, 2009; Journal of Sustainability Education, 2011). Research designed to measure the impact of EfS on students, schools and communities should, among other important outcomes, demonstrate that there is a correlation between the practice of EfS (sustained, comprehensive EfS in day-to-day actions of community members and explicit instruction), and the achievement of communities as measured by sustainable community indicators.

Recent research analyzing the effect of EfS programs on students, teachers, and communities shows multiple, positive and lasting benefits (Becker-Klein et al, 2008; Duffin, 2006; AED/Cloud, 2007; Sobel, 2008; Gayford, 2009; Barrat Hacking et al, 2010; PEER Associates, 2010). For example, several studies indicate that EfS:

- **EfS Effect on Students**:
  - Improves student learning and standards achievement
  - Enhances attitudes towards learning
  - Produces better behavior and attendance
  - Aligns with people's natural ability to learn holistically
  - Significantly decreases students' feeling that they cannot succeed
  - Encourages students to make connections between themselves and the systems of which they are a part.
  - Develops a greater awareness of community, and a greater appreciation of the democratic process
  - Produces statistically significant increases in the strength of students' attitudes about civic engagement
  - Provides a safe and secure space in which children can take risks and develop skills of active participation
- **EfS Effect on Teachers:**
  - Supports both new and veteran teachers in achieving strong academic outcomes from their students
  - Yields meaningful effects on teacher attitudes
- **EfS Effect on Community**
  - Improves whole school cultures
  - Fosters meaningful relationships between the school, parents and the community
  - Improves children's' health by improving their food choices
  - Models actions and attitudes that promote sustainable living
  - Improves air quality, reduces waste, decreases energy and water use

As the Education for a Sustainable and Secure Future Report (NCSE, 2003) states: "Human and global security, economic opportunity, and the quality of life for humans and all species depends upon the continued availability of a life-sustaining environment." **Pre-K-12 Education for Sustainability is uniquely positioned to help address the challenges of environmental, social, and economic sustainability through sustained innovation in teaching and learning**.

Why develop benchmarks for EfS? Sixteen years into the 21st Century, educators and decision makers on the ground must be able to trust that what they are doing, and what they are receiving in the way of assistance, meets the industry standards for EfS. In order for that to happen, we need to have *agreed upon* industry standards or "standards of excellence" for EfS.

Every legitimate field of inquiry has to define itself and re-define itself over time. If it doesn't, someone else will, it will disappear, or worst of all become distorted. A field of inquiry has to establish boundaries for the system of interconnected elements with which it is concerned, and it has to set and re-set the bars of excellence so that those who want to study it, deliver it and assess for it can aspire to the highest degrees of readiness and quality. For years, many countries from around the world have been examining the attributes of EfS/ESD (Education for Sustainable Development as it is often called around the world) through their federal-level education systems, in Colleges and Universities in general, and Schools of Education in particular.

Here in the U.S. a handful of dedicated thought leaders and scholars, in both NGOs and universities, have studied the historical antecedents (Bateson, Fuller, Leopold to name just a very few) from around the country and the globe, studied the needs for a sustainable future, and created multiple EfS frameworks articulated from their own perspectives. This has made the work rich, robust and relevant for our context. Thirty-four thought leaders, authors and scholars in the U.S. and around the world, made their contributions to "The Essential Elements of Education for Sustainability" Matrix in the 2014 issue of the Journal of Sustainability Education's series entitled, The State of the Field.

Subsequently, a core group of the authors, thought leaders and scholars joined a group of emerging scholars in the field to conduct a meta-analysis of our collective body of work with the goal of developing Benchmarks for EfS. We have come together to share, for the first time, our collected works in one place and to synthesize "the State of the Field" and determine what we all agree is essential to educating for a healthy and sustainable–even regenerative future. These Education for a Sustainable Future Benchmarks are the result of that synthesis. We have combined all grade levels here as a starting point—before we attempt over time to determine the developmental appropriateness and depths of knowledge of the different aspects of EfS for different age groups (although some of us have already begun to do that in our own work driven by the markets we serve).

It is our intention that these EfS Benchmarks, which should come to represent the whole of our collective thinking to date, will be used by school administrators and Board members, text book publishers, parents, faculty, students and the community at large, so that they can assess the extent to which their institutions are educating for a sustainable future, and to what extent they are meeting the Benchmarks. More importantly, these benchmarks can help us to produce and distribute the highest quality EfS programs, curricula and learning experiences, intentionally designed to accelerate the shift toward a healthy and sustainable future.

Note: Green buildings and grounds, procurement, investments and improved occupant health are critical components of EfS, and this document does not include benchmarks for them. We recommend LEED, Green Ribbon Awards, CHIPS, Eco Schools, Farm to School and the Living Building Challenge.

BIG IDEAS

LIVING ON EARTH

- A healthy and sustainable future is possible
- Adaptability helps all living things (including us) survive over time
- Creativity is a key property of all living systems and contributes to nature's ability to sustain life
- Humans are dependent on Earth's life-support systems
- Diversity makes our lives possible
- Everything Must Go Somewhere because There is No Such Place as Away
- Healthy systems have limits: Tap the Power of Limits
- Life on Earth creates conditions conducive to life on Earth
- Places are alive, unique and evolving. If we want to flourish over time, our relationship with them must be mutually beneficial
- There is an appropriate rate and scale for every living thing
- Things are always changing
- We are all in this together : We are interdependent on each other and on the natural systems
- We must live by, and learn from the laws and principles derived from nature

MAKING CHANGE

- A small shift in one thing can produce big changes in everything.
- A sustainable solution solves more than one problem at a time and minimizes the creation of new problems.
- Create change at the source not the symptom
- Every system is perfectly designed to get the results it gets.
- Humans now represent a force equivalent to the great geologic changes that have shaped life on Earth (The Anthropocene Epoch)
- It all begins with a change in thinking. The significant problems we face can't be solved with the same thinking we used to create them (Einstein)
- Where do we begin? There is no beginning or end in a system. Start where there are favorable conditions

TAKING RESPONSIBILITY FOR THE DIFFERENCE WE MAKE

- Fairness applies to all. To us and to them and to the "we" that binds us all together
- Sustain-ability requires individual and social learning and community practice
- Recognize and Protect the Commons
- Reconcile Individual Rights with Collective Responsibilities
- Read the Feedback: We must pay attention to the results of our behavior on the systems upon which we depend
- We are all responsible for the difference we make. Everything we do and everything we don't do makes a difference

KNOWLEDGE

Culture, Tradition and Change

The preservation of cultural histories, heritages and knowledge of place, and the transformation of cultural identities and practices contribute to sustainable communities. Students will develop the ability to discern with others what to preserve and what to change in order for future generations to thrive

Different Ways of Knowing

The nature and scope of knowledge across time and cultures. Students will think about how we know what we know and about the epistemology of human thought. They will be called to think about their thinking and to expand their ways of knowing in an effort to flourish over time in a changing world

Healthy Commons

Healthy Commons are that upon which we all depend and for which we are all responsible (i.e., air, trust, biodiversity, climate regulation, our collective future, water, libraries, public health, heritage sites, top soil, etc.). Students will be able to recognize and value the vital importance of the Commons in our lives and for our future. They will assume the rights, responsibilities and actions to care for the Commons.

Inventing the Future

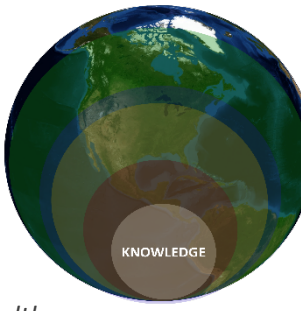
The vital role of vision, imagination and intention in creating the desired future. Students will anticipate and construct plausible futures, do scenario planning, design, implement and assess actions in the service of their individual and collective visions.

Laws and Principles that Govern the Physical World

All living things (including us) are bound by ecological principles and the physical laws derived from nature. We can learn from and translate into design the strategies and attributes of living organisms that have stood the test of time. Students will see themselves as interdependent with each other, all living things and natural systems. They will be able to put their knowledge and understanding to use in the service of their lives, their communities and the places in which they live.

Multiple Perspectives

The perspectives, life experiences and cultures of others, as well as our own. Students will know, understand, value and draw from multiple perspectives to co-create with diverse stakeholders shared and evolving visions and actions in the service of a healthy and sustainable future locally and globally.



KNOWLEDGE continued

Responsible Citizenship or Responsible Local and Global Citizenship

The rights, responsibilities and actions associated with leadership and participation toward healthy and sustainable communities. Students will know and understand these rights and responsibilities and assume their roles of leadership and participation

Strong Sense of Place

The strong connection to the place in which one lives. Students will recognize and value the interrelationships between the social, economic, ecological, geological, and architectural history of that place and contribute to its continuous health. Students will also be able to rotate from a local perspective to a global perspective by developing geo-spatial literacy.

Sustainable Economics

The evolving theories and practices of economics and the shift towards integrating our economic, natural and social systems, to support and maintain life on the planet. Students will know and understand 21st century economic practices and will produce and consume in ways that contribute to the health of the financial, social and natural capital.

System Dynamics and Change

A system is made up of two or more parts in a dynamic relationship that forms a whole whose elements 'hang together' and change because they continually affect each other over time. Students will know and understand the dynamic nature of complex systems and change over time. They will be able to apply the tools and concepts of system dynamics and systems thinking in their present lives, and to inform the choices that will affect our future.

SKILLS

THINKING SKILLS SET

- Creative Thinking
- Critical Thinking
- Design thinking (ecological/sustainable/regenerative design)
- Flexible Thinking
- Futures Thinking/Anticipatory Thinking
- Lateral Thinking
- Reflective Thinking
- Strategic Thinking
- Systems Thinking
- Values Thinking

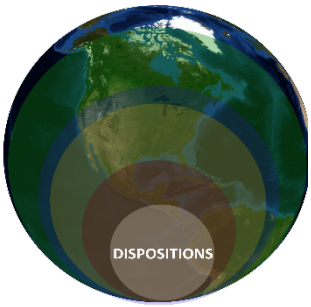
THINKING SKILLS

- Metacognition
- Questioning
- Self-Regulation
- Transference

PRACTICAL SKILL SETS

These are some examples of practical skill sets

- Appropriate Technology
- Building, Making and Tinkering
- Cartography
- Communication
- Computer Modeling
- Design/Drawing
- Gardening/Farming (Organic, Permaculture/Biodynamic, Integrated Pest Management)
- Geospatial Visualization and Analysis
- Mapping (geo spatial, geographic)
- Organizational
- Research
- Vocation and Career Pathway Specific (Green bldgs., Solar/Wind/Geo thermal Energy, Culinary, Automotive, Tourism, Entrepreneurship, etc.)



DISPOSITIONS

DOING

- Efficacious
- Motivated
- Persistent (persevering/grit)

IN COMMUNITY

- Collaborative
- Compassionate
- Empathetic
- Ethical
- Humble
- Place/Community Conscious
- Respectful
- Responsible
- Sense of self
- Trustworthy

LEARNING

- Courageous/risk accepting
- Curious/Life-long learner
- Mindful
- Open Minded

ACTIONS

Build Capacity

- Create Learning Communities
- Educate
- Engage in Dialogue
- Engage in Role-Playing, Learning Journeys & Games
- Honor the specific knowledge and skills that each person and culture brings
- Learn from children and nature
- Learn from your mistakes, build from your successes, and apply what you learn
- Plan Scenarios

Design and Create

- Accept responsibility for the consequences of design
- Apply technology appropriately so that today's solutions don't become tomorrow's problems
- Contribute to the regenerative capacity of the systems upon which we depend
- Count and value all the capital (natural, financial, human and social)
- Design for multiple pathways, resilience and reinforcement
- Design for whole systems integrity with ecological principles and physical laws in mind
- Design to optimize health and adaptability
- Design with efficiency and effectiveness for a no waste world that runs off of sunlight and sugar, contributes to diversity, recognizes interdependencies and taps the power of limits

Lead/Govern

- Ask different questions
- Define and Re-Define Progress
- Determine when enough is enough
- Empower people and groups
- Envision, Strategize and Plan
- Evolve the rules when necessary
- Facilitate a shared understanding of sustainability and regeneration (the goals)
- Govern from the bottom up
- Lead by example
- Relentlessly adjust to the here and now with the future in mind

ACTIONS continued

Be Just, Be Fair

- Be inclusive
- Insist on the mutually beneficial rights of humanity and nature
- Practice justice and equity for all
- Take responsibility for the effect you have on future generations
- Treat all people the way you want to be treated: At the very least, with respect and dignity

Participate and Collaborate

- Act wisely individually and collectively, with precaution and in context
- Create and maintain highly functional and successful teams
- Leave every place better than you found it
- Leverage the least change for the greatest effect
- Listen to one another
- Serve your community
- Take responsibility for the difference you make
- Trust local wisdom

INSTRUCTIONAL PRACTICES FOR THE LEARNING CLASSROOM

Curriculum Design Process

- Backwards Design/Understanding by Design (UbD)
- Curriculum Documentation and Mapping

Attributes of Excellent Instructional Practices

- Academically Comprehensive
- Assessment/feedback driven
- Authentic
- Constructivist
- Developmentally Appropriate
- Differentiated
- Inclusive
- Inspires Life-Long Learning
- Interdisciplinary
- Learner-Centered
- Reflective
- Solution Oriented/Preferred Future Driven
- Standards Based

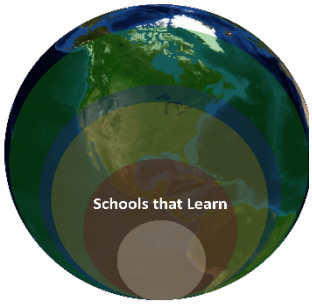
Varied Methodologies

- Applied Learning
- Collaborative/Cooperative Learning Communities
- Inquiry based
- Interactive Media/technology
- Project based
- Place based
- Service learning
- Writing Process

Instructional Frames of Reference

- Students are leaders and their voices must be heard
- Teachers are learners, professional developers and coaches
- Professional learning communities and communities of practice contribute to the speed and quality of individual and organizational learning and action
- Teachers are advocates for Education for Sustainability and for youth leadership

- Teachers, administrators, parents, students and all stakeholders will learn and develop the "Lens" (big ideas, knowledge, skills, dispositions and actions) of Education for Sustainability if we want human and other life to flourish on Earth indefinitely
- The places in which we live *are* curriculum and instruction



SCHOOLS THAT LEARN: ORGANIZATIONAL POLICIES AND PRACTICES

Where we learn matters, and will influence our inclination to love and connect to the places in which we live.

In schools that learn, everyone is encouraged to keep thinking, innovating, collaborating, talking candidly, improving their capabilities, self-correcting, and making personal commitments to a shared future…

Policy Alignment

- The structures, systems and processes in place for decision making, implementation, and formative assessments are congruent and aligned with the purpose and values of the school community and the thinking reflects the knowledge, skills, dispositions and actions that characterize Education for Sustainability
- Priorities do not compete with one another, and instead, are mutually beneficial.

School Culture

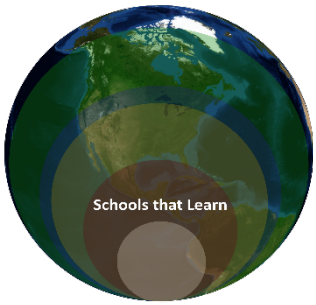
- School culture encourages and sustains innovation, participation, collaboration, reflection, celebration and continuous learning and improvement for all. It reflects the responsive and adaptive cycles of growth, reorganization and renewal
- School community members share what they are learning with one another and with other communities
- Effective curriculum and instructional practices that educate for sustainability are attributed to the authors and shared widely in order to increase the speed and scale of diffusion and adoption
- Practices of purchasing, procurement, consumption and production of materials, resources, transportation and services model the principles of sustainability at all levels

Leadership

- Leaders track and plan with knowledge of external and internal driving forces and trends, and are able to envision preferred futures for their schools that are not limited by the past or by the current reality.
- Managers are able to translate the vision of the preferred future into tangible and measurable action steps, performance assessments, cultural diffusion and cultural transmission over time.
- Leaders and managers operate with theories of change and change strategies that are congruent with the types of changes being made. Disruptive innovations are diffused differently than changes that are easily assimilated. Systems thinking is employed and system dynamics are considered when facilitating systemic change.
- Catalytic and servant leadership qualities are developed in all members of the school community

Planning Process and Design Principles

- Continuous and iterative visioning, design and planning processes are developed that are inclusive of school community stakeholders;
- A range of potential future scenarios are considered and prepared for, while charting a course toward the preferred future



SCHOOLS THAT LEARN continued:

Monitor, Assess and Adjust for Feedback on Progress

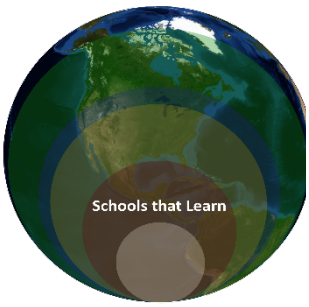
- Mechanisms are designed, implemented and sustained to visibly track feedback on progress over time regarding student learning outcomes, vertical and lateral curriculum integration, organizational practices, and buildings, grounds and operations.
- School community stakeholders' performance is aligned to purpose and strategic goals
- The schools' contribution to sustainable community development is visibly tracked, measured and communicated.
- School and community assets are mapped, strengths assessments are conducted and gap analyses are administered periodically in the service of continuous improvement over time.
- Policies and practices are proactive, responsive and adaptable. Careful thought is given to what should be preserved and what should be changed in order for the students and larger school community to thrive over time

Curriculum and Instruction

- The curriculum (desired results, essential questions, assessments and shared performance criteria that produce evidence of student learning) is designed (using backwards design/UbD) dynamic, documented, mapped, provides continuity, and is accessible to all faculty and school community members and continually updated and improved. Mapping is a verb not a noun.
- Where a curriculum is not provided, Faculty are provided the time, opportunity, professional development and coaching to design (using backwards design/UbD), document and map new or yet undocumented curricula across all grade levels and disciplines.
- All required content and performance standards, EfS benchmarks and other aligned competencies that the school/district prioritizes are embedded and integrated into the curriculum in developmentally appropriate places. Expected depths of knowledge are indicated and assessed for throughout the vertical scope and sequence.
- Curriculum Maps and especially analytics are viewed and used regularly in critical conversations among faculty and among faculty and administrators.
- Faculty have regular opportunities to analyze student work together in the service of continuous improvement
- Exemplary lessons, learning experiences, resources and instructional practices are continually documented and accompany courses and units for use by teachers in the classroom or for professional development and coaching purposes.
- Faculty are provided with time, professional development, coaching and learning communities they need to meet strategic goals and to educate for sustainability

Learning Spaces

- The buildings, the classrooms, the grounds and the community are all utilized as learning spaces for children, young people and adults, and contribute to their social emotional development, academic achievement, learning, and individual and collective wellbeing
- The Administration's policy is to utilize Green School Standards (US Dept. of Education's Pillars One and Two) like LEAD, CHIPS, LIVING BUILDING CHALLENGE, GREEN RIBBON AWARDS…) to guide their practices regarding physical plants, grounds, procurement, purchasing and operations



SCHOOLS THAT LEARN continued:

Investment of Resources

- Investments of time and money are strategic in the short and long term, are efficient and effective, and eliminate the waste of time, materials and energy.
- Schools' investments in construction, upgrading and retrofitting its facilities, materials and equipment improve their impact on the health of all living systems.
- Money saved or generated is re-invested in the schools' continuous progress
- Where applicable, schools make external financial investment decisions based on the criteria of short and long term ecological integrity, financial prosperity, and social well–being

Human Resources

- Hiring & Orientation
    - Hiring policies and practices, job descriptions, qualifications and choices are consistent with the schools' purpose and strategic goals to educate for sustainability. Priority is given to new faculty hires who have a successful track record in implementing education for sustainability in their discipline or in the grade level they will teach and all hires are expected to be willing and able to learn how to contribute to sustainability through their professional role in the school community and their every day practices.
    - New hires are oriented to the policies and practices of the school. Mentorships, apprenticeships, peer to peer coaching and professional development and coaching are offered to new hires so that the cultural traditions, norms and language, curriculum and effective instructional practices are transmitted from generation to generation.
- Performance Assessments and Incentives
    - Performance assessments, grants, recognition awards and other incentives produce individual and collective learning for the adults being assessed and are aligned with the shared purpose of education in the school community, the strategic goals and instructional priorities and the plan to educate for, and contribute to sustainability.

COMMUNITY CONNECTIONS

Creating new patterns of relationships between schools and their communities that acknowledge Education for Sustainability as inextricable from sustainable community development

Schools and Communities Learn & Work Together in Partnership

- Develop sustainable community visions and re-visions over time
- Conduct Needs Assessments and Map Community Assets
- Co-Design and implement short and long term projects and programs that are mutually beneficial to partners, are inclusive of all stakeholders and are participatory in nature
- Develop, measure and monitor SMART (Specific, Measurable, Achievable, Realistic & Time Bound) goals and Sustainable Community Indicator Sets. Schools data is embedded in social, ecological and economic indicators sets
- Evaluate progress (read the feedback), reflect, adjust, and continually improve performance

Schools Serve as Resources to the Community

- Students and Teachers make authentic contributions to sustainable community development through Service Learning opportunities, Project-Based and Place Based Learning opportunities for students that are laterally and vertically embedded in the core curriculum
- School buildings and grounds serve the whole community as learning hubs for continuing education of individuals as well as school and community stakeholders to learn together for the future they want
- School buildings and grounds serve the whole community as places to celebrate

Communities Serve as Resources to the Schools

- Local Community Based Organizations, Service organizations, local government agencies, boys and girls clubs, local businesses, Elderhostels, parks and reserves, state and national forests, residential centers, nature centers, zoos, museums, 4-H clubs, scouting organizations, etc. provide:
- Internships to Students
- Mentorships to Students and Faculty
- Independent and Curriculum Based Learning Sites (Case Studies, Learning Journeys, Research Sites
- Physical spaces for school and community stakeholders to learn and work together for the future they want
- Physical spaces for school and community stakeholders to celebrate together

Schools and Communities Celebrate and Reflect Together

- Regularly and publicly recognize and celebrate individual and collective successes, and progress toward green schools and sustainable community goals on an ongoing basis at events and in the media
- Make time to reflect on where we are, how we got here, how far we have come, how close we are to where we are going, and what we are going to do next.
- Celebrate the learning that comes from worthy failures

APPENDIX I

SAMPLE TOPICS OFTEN INTEGRATED WITH EfS BENCHMARKS

Design Solutions for the Natural & Built Environment

- Appropriate Technology
- Biomimicry
- Clean, Green Renewable Energy
- Closed Loop Manufacturing
- Cradle to Cradle
- Ecological and Regenerative Design
- Farm to School, Garden to Table, Farm to Table
- Green Buildings, Rating Systems and Certifications (LEED, CHIPS, LIVING BUILDING CHALLENGE, ECO SCHOOLS, GREEN RIBBON AWARDS…)
- Green Chemistry
- Living Buildings
- Permaculture, Organic Farming, Bio-Dynamic Farming, Forest Farming
- School & Community Gardens
- Sustainable Business
- Sustainable Transportation, Food Systems, Communities, Infrastructure and Planning

Human Challenges

- Employment/Careers
- Environmental Justice
- Globalization
- Health
- Power and Privilege
- Social Justice and Equity
- Sustainable Development
- Women and Sustainable Development

Inter-Relationships

- Amensalism: In the context of cooperation, what is neutral for one, is harmful to the other
- Commensalism: In the context of cooperation, one benefits and the other is neutral
- Dominion vs Stewardship
- Mutualism: Mutually beneficial relationships
- Parasitism: In the context of cooperation, one benefits and one is harmed
- Predation: Predator feeds on its prey, kills its prey, then absorbs prey tissues
- Symbiosis between different elements: Living together of unlike organisms

The Natural World

- Air
- Biodiversity
- Food Systems
- Forests
- Oceans
- Soil
- Symptoms/indicators of unsustainability i.e., climate change, hunger, deforestation, ocean acidification, pollution, loss of biodiversity
- Water

APPENDIX II

Selected Disciplines & Fields of Study that Contribute to Education for Sustainability

- Economics
  - Ecological Economics
  - Environmental Economics
  - Sustainable Economics
- Education
  - Climate Literacy
  - Creative Process
  - Conflict Resolution Education
  - Cultural Competency Education
  - Design Thinking
  - Ecological Literacy
  - Environmental Education
  - Gaming to Learn
  - Geospatial Literacy
  - Global Education
  - History and Environmental History
  - Holistic Education
  - Mindfulness
  - Oceans Literacy
  - Social Emotional Learning
  - Systems Thinking and System Dynamics Education
- Engineering and Design
  - Biomimicry
  - Cradle to Cradle Design and Manufacturing
  - Ecological Design and Architecture
  - Life Cycle Analysis with Full Cost Accounting
  - Regenerative Design and Architecture
  - Sustainable Community Design
- Farming and Gardening
  - Bio-dynamic Farming/Gardening
  - Forest Farming
  - Integrated Pest Management
  - Organic Farming/gardening
  - Permaculture
- Sciences
  - Adaptive Systems
  - Biology
  - Biomimicry
  - Chemistry and Green Chemistry

  - Earth System Science
  - Ecology
  - Environmental Science
  - Game Theory
  - Geography
  - Geospatial Science
  - Global Environmental Change
  - Human Geography
  - Natural Sciences
  - Neuroscience (particularly related to learning, re-framing/re-wiring, creativity and moral decision making)
  - Oceanography
  - Physics
  - Resilience Science
  - Quantum Physics
  - System Dynamics
- Social Sciences
  - Creativity and The Arts
  - Ecological Psychology
  - Ethics and Environmental Ethics
  - Future Studies
  - Game Theory
  - Organizational Learning and Change
  - Philosophy
  - Positive Psychology
  - Science of Happiness

APPENDIX III

Aligned 21st Century Innovations/Standards/Strategic Initiatives/Frameworks

- Character Education
- Common Core Standards
- Critical Thinking Model (Paul-Elder)
- Cultural Competency (Jones)
- C3 Framework for Social Studies State Standards
- Entrepreneurial Mindset
- Green and Sustainability Career and Technical Education (CTE) Standards (NASDCTEc)
- Growth Mindset (Dweck)
- Habits of Mind (Costa and Kallick)
- Mindfulness Attributes
- Next Generation Science Standards (NGSS)
- Neuro-Leadership (Rock)
- Partnership for 21st Century Skills (Kay)
- Social-Emotional Intelligence Attributes (Goleman)
- Systems Thinking Habits (Booth Sweeney, Waters Foundation)
- True Grit (Duckworth)
- Understanding by Design (Wiggins)
- Whole New Mind (Pink)

APPENDIX IV
Resource Index

(This will be organized by category for easy reference and use by educators. We imagine curriculum exemplars, primary source documents, films, articles, etc. here—things educators can use to build robust learning experiences for their students)

BIG IDEAS

KNOWLEDGE

SKILLS

DISPOSITIONS

ACTIONS

INSTRUCTION

ORGANIZATIONAL LEARNING

COMMUNITY CONNECTIONS

TOPICS

DISCIPLINES AND FIELDS OF STUDY

ALIGNED FRAMEWORKS

APPENDIX V
Bibliography

(This is just a partial list to get us started. We will make this comprehensive from the work of the authors and then invite others to add to it over time by discipline/field of study)

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APPENDIX VI
Research and Evaluation

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