Integrating Sustainability Across the Curriculum: Disciplinary connections and rubrics to assess courses

Prepared for Lorain County Community College (LCCC) with support from The Oberlin Project
Creative Change Educational Solutions (CCES) is a national leader in Education for Sustainability (EfS). Based in southeast Michigan, we support K20 leaders and institutions to make EfS the basis of policy and practice. Our approach to curriculum transformation and leadership development places food systems, revitalization, and other sustainability issues at the center of innovation and reform.

We believe that sustainability is not an add-on, but a vital context for improving and connecting student achievement, civic engagement, and community wellbeing. Our programs help institutions transition to this new way of teaching and learning. We embed new practices into existing structures while developing leaders with the vision to shape new models. Customized programs combine strategic planning, professional development, and curriculum licensing. By building institutional capacity, we create the conditions for lasting and successful change.

**The Curriculum Resource Center**

Our Curriculum Resource Center (CRC) is a digital content library of sustainability courses, units and instructional resources for K20 educators. Topics include food systems, renewable energy, brownfields redevelopment, intercultural communication, and other topics. This growing collection of multimedia materials, developed in-house by our experts and partners, supports educators to integrate sustainability into a range of units, courses, and programs.

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I) What is sustainability?

The term sustainability is often linked to the 1987 publication of Our Common Future, a landmark report by the World Commission on Environment and Development (WCED). Known as the Brundtland Report¹, the document highlighted the three major dimensions of sustainability: improving economic prosperity, creating more equitable societies, and maintaining the long-term viability of the environment. The report coined a much-quoted definition of sustainable development: *meeting the needs of the present without compromising the ability of future generations to meet their needs* (WCED, 1987).

Building on this, LCCC’s definition of sustainability is as follows:

*Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony. Sustainable principles, when applied, lead to the creation of systems that balance social, economic and natural resource requirements of present and future generations.*

Sustainability is also a part of LCCC’s Vision 2.0. As noted on LCCC’s website, “Vision 2.0 creates the future directions for LCCC and represents the collective input from those we serve in helping to shape and create priorities that will enhance our community’s educational attainment and competitiveness needed for this knowledge economy.”

To advance sustainability as part of this, LCCC will “promote and incorporate practices that result in positive outcomes for our social, economic, and natural environments both today and in the future.”

¹ The commission is formerly known as the World Commission on Environment and Development (WCED). It was convened by the United Nations in 1983 and is named for its chair, Gro Harlem Brundtland. Our Common Future, known as the Brundtland Report, was published in 1987 in book form by Oxford University Press.
II) What does it mean to integrate sustainability into the curriculum?

Sustainability and sustainable development can be taught as a specific topic or area of inquiry. But integrating sustainability does not require this approach. Rather, sustainability can be interpreted as something bigger: a set of principles and concepts that provide a lens for learning. In this approach, sustainability is an overall orientation rather than a discreet topic.

We offer the following set of **Foundation Sustainability Concepts** to guide integration:

- beauty
- change
- community
- diversity
- ecological health
- equity
- ethics
- interdependence
- limits/scale
- resilience
- systems
- wellbeing

(Daly, 1980; Daly & Cobb, 1989; Hopkins & McKeown, 2002; Meadows, 2008; World Commission on Environment and Development, 1987)

Infusing these concepts into academic disciplines moves inquiry into the realm of sustainability without the need to use the term. The tables on the following pages show how the concepts relate to each discipline. LCCC’s five Core Outcomes are reflected in these matrices.

**LCCC’s Five Core Outcomes:**

- **C1**: English: Demonstrate logical organization, coherent thinking, and precision in writing.
- **C2**: Mathematics: Utilize college mathematics to solve problems.
- **C3**: Natural Science: Apply scientific concepts and methods of inquiry.
- **C4**: Social Science: Apply concepts, principles and methods of inquiry in the social sciences.
- **C5**: Humanities: Examine the nature of human expression and/or artistic creativity.
<table>
<thead>
<tr>
<th>Concept</th>
<th>Sciences/Math</th>
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</thead>
<tbody>
<tr>
<td><strong>Diversity</strong></td>
<td>Biological and human diversity.</td>
<td>Cultural and social diversity.</td>
<td>History and literature from a multicultural perspective.</td>
<td>Conducting business in ways that respect &amp; maintain biological and cultural diversity.</td>
<td>Arts from a multicultural perspective.</td>
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<td></td>
<td>Impacts of genetic engineering.</td>
<td>Epistemology: Understanding that 1) there are different ways of knowing (science, religion, traditional knowledge, etc.), 2) the dominant (i.e., power) culture values Western science, and 3) citizens must be able to select and apply different ways of knowing based on context.</td>
<td>Equity in the criminal justice system: profiling; equity in sentencing; restorative justice; genetics and their use in forensics. Cross-cultural conflict resolution.</td>
<td>Full-cost accounting that incorporates value of diversity. Ex: Correcting the price of mono-cropped or genetically modified fruit to reflect the value of lost biodiversity. Redefining “efficiency” in ways that account for above.</td>
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<td><strong>Ecological Health</strong></td>
<td>Ecological Footprinting, ecological restoration, permaculture, appropriate technology, biomimicry, renewable energy.</td>
<td>Environmental psychology and behavior: What motivates people to protect or respect the environment? Environmental justice: Does everyone have access to a healthy environment and the democratic structures needed to advocate for one?</td>
<td>Understanding human-environmental interactions through history. Analyzing ways literature and religion influence our perceptions of the environment and other cultures. Ways language encodes metaphors and beliefs about the environment and “others.”</td>
<td>Incorporating ecological principles as the basis of design. Industrial ecology and “cradle to cradle” life cycles.</td>
<td>Representation of nature and human-environmental relationships in different art forms/genres/periods: What are the messages?</td>
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<td></td>
<td>Regeneration of ecosystem services is essential for sustainability.</td>
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<td>Interdependence</td>
<td>Applying the principle of interdependence to other sciences: physics (thermodynamics), chemistry (impacts on health, and the environment). Psychology: the need for connection to community. Social structures and their impacts on interdependence and sustainability. The evolution of empathy and cooperation.</td>
<td>Identifying interdependence in human and non-human relationships through literature, linguistics, religion and philosophy.</td>
<td>Identifying interdependent economic, ecological and social relationships and analyzing if economic theories and models take these into account.</td>
<td>Exploring how the art of a particular time or culture represents relationships among humans, non-humans, and non-living things.</td>
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<td>Limits/Scale</td>
<td>Respecting ecological limits in the use and application of science. Analyzing ways the scale of human activity and social organization affects sustainability.</td>
<td>Understanding that assumptions about “development,” “growth,” and “progress” are embedded in language.</td>
<td>Analyzing business trends and their relationship to limits and scale. Identifying the optimal scale for a particular sector in the economy.</td>
<td>Exploring how the art of a particular time or culture represents ecological, social, and personal limits.</td>
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<td><strong>Resilience</strong></td>
<td>Applying nonlinear functions to model changes in complex systems.</td>
<td>Developing policies and legal structures that support resiliency in people and communities. Ex: Restorative justice.</td>
<td>Examining social and linguistic structures that contribute to resiliency. What is the role of folk knowledge? Of “expert” knowledge?</td>
<td>Developing economic and financial systems that minimize large-scale disruptions and can “bounce back” from downturns.</td>
<td>Arts as a means to build public engagement and community spirit.</td>
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<td><strong>Systems</strong></td>
<td>Applying systems thinking elements such as feedback loops to understanding and solving sustainability challenges.</td>
<td>Investigating systemic factors that affect social issues. Understanding communities and systems of social, ecological, economic and cultural relationships.</td>
<td>Exploring connections among social, cultural and linguistic patterns and trends.</td>
<td>Understanding that economic systems are subsystems of ecological systems. Applying systems thinking elements (e.g., feedback loops) to business decisions and economic policies.</td>
<td>Exploring connections among social, cultural and linguistic patterns and trends.</td>
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<td><strong>Wellbeing</strong></td>
<td>Applying sciences to support health and wellbeing: green chemistry, nutrition, physiology, mental health, etc.</td>
<td>Applying social sciences to support health and wellbeing topics related to environmental justice, psychology and sustainability.</td>
<td>Identifying how literature, linguistics, and religion impact wellbeing.</td>
<td>Creating business structures that support economic &amp; ecological wellbeing.</td>
<td>Exploring how art supports personal, social, and cultural wellbeing.</td>
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IV) Sustainability Pedagogy and LCCC’s Infused Outcomes

The complexity of sustainability requires that educators learn to teach in ways that support K12 students’ integration of content across disciplines, while thinking critically and solving meaningful problems. Key components of EfS include (McKeown, 2002; Santone, 2004; Tilburry, 1995):

- Integrated scientific, social, cultural, social-emotional, and ecological literacy
- Civic involvement in place and community
- Critical thinking, decision-making, collaborative problem-solving, and interpersonal communication (“21st Century skills”) applied to solve local and global challenges
- Entrepreneurship
- Appropriate applications of technology that help solve, not create, problems
- Equity, justice, inclusivity, and respect for all people
- A pedagogy that develops community, shared vision, and compassion

These outcomes overlap with LCCC’s infused outcomes—those built into courses across the curriculum:

- In1: Critical Thinking: Employ critical thinking skills in addressing issues and problems.
- In2: Communication: Demonstrate competence in verbal and nonverbal communication.
- In3: Diversity: Analyze the role of diversity in the development of the individual, the community, and the global society.
- In4: Ethics: Apply personal, professional, social and civic values.
- In5: Health: Identify behaviors that promote health of the individual.
Sustainability pedagogy and its connection to Service Learning (SL) and Experiential Learning (EL)

In addition, Efs pedagogy integrates the principles of Service Learning (SL) and Experiential Learning (EL)/Experiential Education. LCCC uses the following definitions and criteria that draw from the work of leading organizations in the field.

- **Service Learning**: a teaching and learning strategy that integrates community service with academic instruction while focusing on critical, reflective thinking and civic responsibility (Adapted from the American Association of Community Colleges [AACC]).
- **Experiential Education or Learning**: “a philosophy that informs many methodologies in which educators purposefully engage with learners in direct experience and focused reflection in order to increase knowledge, develop skills, clarify values, and develop people’s capacity to contribute to their communities” (The Experiential National Education Association).

LCCC has also adopted the National Society for Experiential Education (NSEE) guidelines to help evaluate EL activities at LCCC. These guidelines stipulate that quality EL education must contained all seven of these criteria:

- Authenticity and Intent
- Preparedness and Planning
- Reflection
- Orientation and Training
- Monitoring and Continuous Improvement
- Assessment and Evaluation
- Acknowledgement

These criteria inform the rubrics that follow.
V) Rubrics to assess the depth and rigor of sustainability integration in a course

Rubric purpose and design

The following rubrics are designed to evaluate sustainability integration in a particular course. As noted, the rubric categories and criteria draw upon the principles of Service Learning, Experiential Learning. The rubric also reflects LCCC’s definition of sustainability (p. 2) and the Infused Outcomes (p. 8).

Finally, the criteria and overall rubric design also integrate definitions of “sustainability-focused” and “sustainability-infused courses” as defined in the STARS Technical Manual (version 1.2, page 39) from the Association for the Advancement of Sustainability in Higher Education (AASHE):

- **Sustainability-focused courses** concentrate on the concept of sustainability, including its social, economic, and environmental dimensions, or examine an issue or topic using sustainability as a lens.

- **Sustainability-related courses** incorporate sustainability as a distinct course component or module or concentrate on a single sustainability principle or issue.

The STARS manual also suggests that institutions consider asking “whether or not a given course will help students to achieve one or more of the following” (p. 42):

- Understand and be able to effectively communicate the concept of sustainability.
- Develop and use an ethical perspective in which they view themselves as embedded in the fabric of an interconnected world.
- Become aware of and explore the connections between their chosen course of study and sustainability.
- Develop technical skills or expertise necessary to implement sustainable solutions.
- Understand the way in which sustainable thinking and decision-making contributes to the process of creating solutions for current and emerging social, environmental, and economic crises.
- Contribute practical solutions to real-world sustainability challenges.
- Synthesize understanding of social, economic, and environmental systems and reason holistically.

The document further notes that a single course need not meet all these criteria to be considered sustainability-focused or sustainability-related.
## Rubrics

<table>
<thead>
<tr>
<th>1) Framing of sustainability</th>
<th>Novice</th>
<th>Emergent</th>
<th>Leader</th>
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<tr>
<td>Sustainability is viewed as an environmental issue and a topic for science courses only. Course content focuses on the isolated “green” topics that present the environment as an optional add-on.</td>
<td>Sustainability is viewed as an environmental issue and a topic for science courses only. Course content focuses on the isolated “green” topics that present the environment as an optional add-on.</td>
<td>The framing of sustainability in the course goes beyond environmental science with some connections to economic, diversity, and social equity dimensions. The course addresses a sustainability topic in a specific unit or assignment, but does not carry sustainability through as an overall thread.</td>
<td>Sustainability serves as an overall instructional lens. It is understood and communicated as a set of principles and concepts relevant to all disciplines, affecting both content and pedagogy. The course challenges students to consider themselves as parts of larger social and ecological communities. Students “analyze the role of diversity in the development of the individual, the community, and the global society” (LCCC Infused Outcome 3). The course helps students explore the connections between their chosen course of study and sustainability.</td>
<td>N/A</td>
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| 2) Length of instruction | The course integrates sustainability content or principles in several days of the course or as a “side bar.” | The course integrates sustainability content or principles during multiple weeks or “insertion points” throughout the course. | The entire course is infused with sustainability content/concepts. | N/A |
### Rubrics

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<tr>
<td>3) Ethics</td>
<td>The course does not engage students in considering ethics as part of making decisions. OR Course content or topics are presented as value-neutral and thus without the need for ethical considerations.</td>
<td>Course content has students consider ethics in informal ways. Students consider their own values, but do not examine the beliefs or perspectives of others.</td>
<td>Course content requires students to deeply consider and apply “personal, professional, social and civic values” (LCCC Infused Outcome 4). Reflection and discussion of ethics and values are explicit. Students examine multiple ethical perspectives.</td>
<td>N/A</td>
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<tr>
<td>4) Experiential and Service Learning</td>
<td>The course learning activities are passive and limited to lectures and videos. Opportunities for service are insignificant, contrived, or have an inauthentic audience. Service is limited to symbolic acts that are disconnected from learning. (Example: A food drive without a broader investigation of food issues.) Environmental service activities focus on “helping” the environment without having students considering their place in it.</td>
<td>Course learning activities are interactive. They engage students in authentic experiences followed by appropriate debrief and analysis. Opportunities for service and action are appropriate for the students. The audience is authentic, such as peers, the school, community, or larger world.</td>
<td>The course integrates “community service with academic instruction while focusing on critical, reflective thinking and civic responsibility” (AACC). The course supports student-led inquiry and community investigations. All criteria in the Emergent category. Additionally, there are significant opportunities for students to make decisions, plan, execute, monitor and evaluate their ideas and actions (NSEE). Students “employ critical thinking skills in addressing issues and problems” (LCCC Infused Outcome 1). Service activities include individual and collective actions that foster the common good.</td>
<td>N/A</td>
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NOTE: The following correlates to the infused outcome of diversity.

<table>
<thead>
<tr>
<th>Democratic and culturally-responsive pedagogy,</th>
<th>Connections to students’ lives, cultures and communities are basic or trivial (i.e., putting up “multicultural” posters). The pedagogy is teacher-centered. Students work mainly alone.</th>
<th>Course content includes some authentic linkages to students’ lives, cultures and communities. The pedagogy has elements of experiential learning (see above). Students work both individually and in groups.</th>
<th>Learning activities reflect multiple teaching techniques that respond to the needs and styles of diverse students. Instructional methods support student engagement with deep connections among sustainability, equity, and democratic values. Students work in multiple modes: individually, in groups, online, etc.</th>
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Works Cited


