



Lori De La Cruz

Sustainability: Designing Interdisciplinary Opportunities for Teaching

Integrating Sustainability into Curriculum

“Meeting the needs of the present without compromising the ability of future generations to meet their own needs.”

– *Gro Harlem Brundtland*

“Our Common Future”
United Nations, 1987

Faculty Workbook

- ❖ Part of a larger sustainability process that:
 - ❖ creates a new community through student and faculty engagement and a shared vocabulary
 - ❖ offers cross-disciplinary opportunities for discourse



Organizations

- ❖ Second Nature Commitment programs
 - ❖ Carbon
 - ❖ Climate
 - ❖ Resilience

- ❖ AASHE STARS reporting system



“[The Plan] should also describe planned actions to make climate neutrality, resilience, and sustainability a part of the curriculum and/or other educational experience for all students as well as actions to expand research, community outreach and/or other efforts toward the achievement of GHG reductions for the institution and/or the community and society.”

– *Second Nature Commitments*

Barriers

- ❖ Disciplinary structure of the institution: “Many students and faculty work within a specific discipline of study and see little need to engage outside their own discipline.” [Wynsberghe, 2015]
- ❖ Belief that it is “better for students to get disciplinary training first” and “wait until later on in their schooling to deconstruct that foundation.” [Moore, 2005]

Systems Thinking

“A system is a set of things that may not seem related at first glance, but as students are encouraged to widen their view to take in more information the broadening scope will increase the number of interrelations and impacts available for students to think more critically about a situation.” [Meadows, 2008]



**Systems thinking is necessary
when speaking to students about
civic engagement.**

“...teachers must help students
develop as citizen stewards, able to
grasp and promote concepts of healthy
ecological and social systems.”

**We also need to teach more
broadly and cooperatively to
successfully integrate
sustainability.**

“It will also involve the active use of
ecological intelligence that serves to
support the extension of this sense of
connectedness to all life on Earth so as
to develop the ability to see complex
patterns in interconnectedness, cycles,
and limitations of which humanity is a
vital part.”

– John A. Cassell and Thomas Nelson

Current Resources

There are hundreds of online resources designed to assist faculty with inserting sustainability into specific disciplines such as engineering, biology, geosciences, business, sociology, STEM, etc.

There are also publications that provide an overview of how to implement sustainability initiatives such as **developing environmental management systems, designing campus greening projects, landscaping a sustainable campus and planning for climate action.**

This workbook serves as a tool for bridging disciplinary silos.

The workbook is designed to:

- ❖ Illustrate how sustainability correlates with current courses;
- ❖ Provide interdisciplinary opportunities for teaching;
- ❖ Equip students with a basic understanding of sustainability in the world and the workforce; and
- ❖ Improve students' critical thinking skills through thoughtful discussion and interdisciplinary assignments.

SUSTAINABLE DEVELOPMENT GOALS



“Two years ago, world leaders adopted the ambitious 2030 Agenda for Sustainable Development, with seventeen Sustainable Development Goals at its heart. The Agenda is our shared plan to transform the world in fifteen years and, crucially, to build lives of dignity for all.”

António Guterres
Secretary-General, United Nations

GlobalGoals.org

GlobalOpportunityExplorer.org

SustainableDevelopment.un.org

WorldsLargestLesson.globalgoals.org

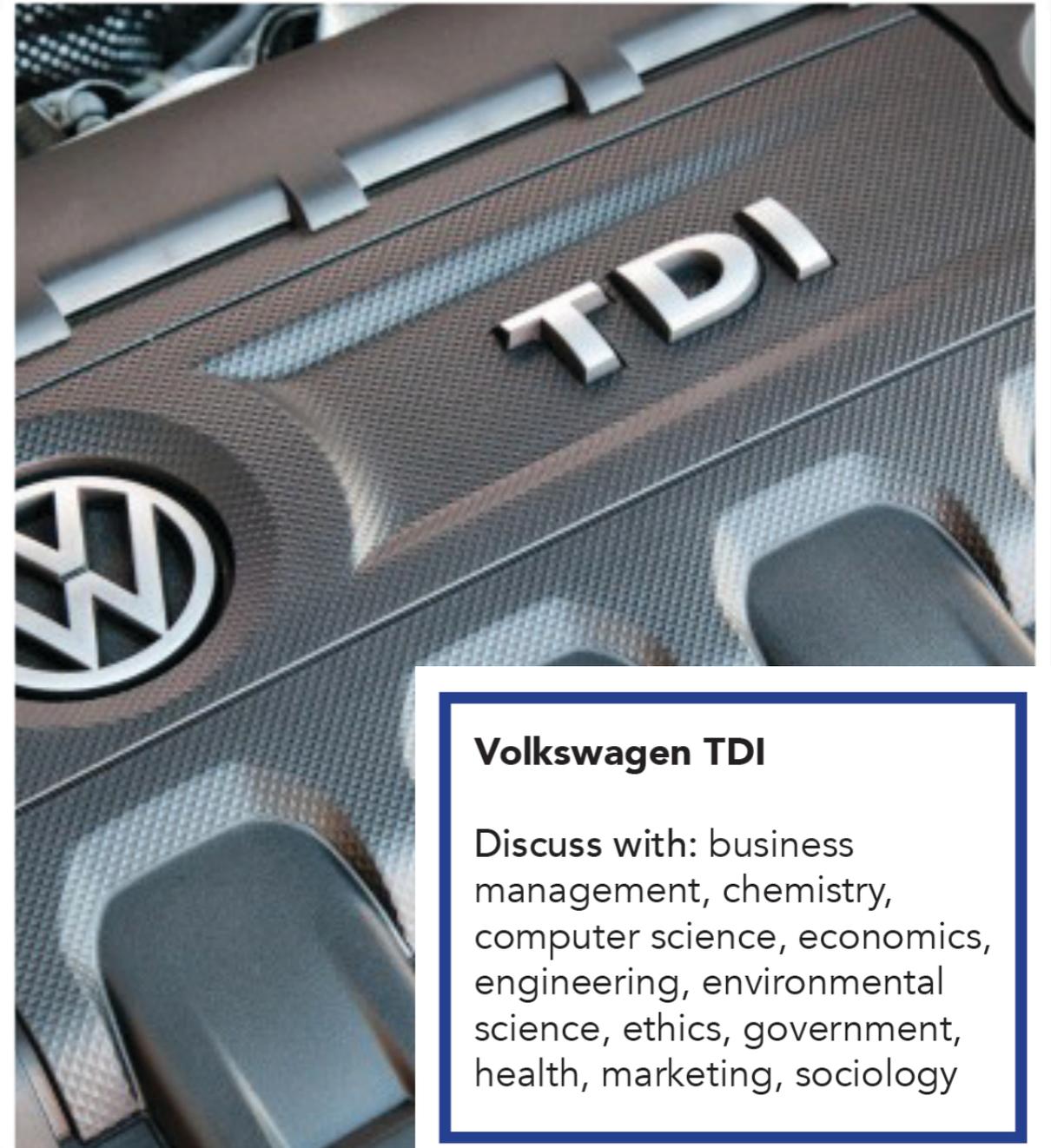
Breakthrough.unglobalcompact.org

UNGlobalCompact.org

Correlates with Current Courses

Volkswagen TDI Scandal

- “Clean Diesel” fabrication
- Consumers duped
- Increased emissions (global impact)
 - > elevated NO_x emissions
 - > 300x worse than CO₂
- Economically damaging
 - > employees (manufacturing, dealerships, parts)
 - > shareholders
 - > global communities & businesses



Computer Science

Analyze computer components

- Damage from mining
 - > rare earth minerals
 - > conflict minerals: tantalum, tin, tungsten, gold
- Pollution poisoning farms & villages
- Recycling in third-world countries
- Wages/treatment of manufacturing line-workers

Computer Science 1405: Business Computer Applications

Textbook Referenced:

GO! All In One: Computer Concepts & Applications, Second Edition
Shelley Gaskin, Nancy Graviett, Debra Geoghan
Pearson. Upper Saddle River, New Jersey 07458

Aligning computer science curriculum with sustainability is more general in the sense that technology hardware requires the mining of nonrenewable resources, often imported from foreign countries. Consideration should also be given to both the economic and social consequences of mining operations both at home and abroad.



Mined materials

Geology.com: "Rare Earth Elements" <http://geology.com/articles/rare-earth-elements/>

Source Intelligence: "What are conflict minerals" <https://www.sourceintelligence.com/what-are-conflict-minerals/>

60 Minutes: "Rare Earth Minerals" <https://www.youtube.com/watch?v=N-1HiX0HiAuo>

FastCompany: "How a handful of countries control the Earth's most precious materials" <http://www.fastcompany.com/1694164/how-handful-countries-control-earths-most-precious-materials>

EIC Coalition: "Conflict-free Minerals Reporting Initiative" <http://www.eic-coalition.org/initiatives/conflict-free-sourcing-initiative/>

FastCoExist: "In 2016, Intel's entire supply chain will be conflict-free" <http://www.fastcoexist.com/3055066/change-generation/in-2016-intels-entire-supply-chain-will-be-conflict-free>

Recycling

60 Minutes: "The Wasteland" <https://www.youtube.com/watch?v=cVORB-bZBbOk>

Computer Science

Discuss with: biology, business management, chemistry, criminal justice, economics, education, engineering, environmental science, ethics, geology, government, health, history, marketing, nutrition, physics, sociology

Geology: Dust Bowl

“Dry land farming on the Great Plains led to the systematic destruction of the prairie grasses. In the ranching regions, overgrazing also destroyed large areas of grassland. Gradually, the land was laid bare, and significant environmental damage began to occur. Among the natural elements, the strong winds of the region were particularly devastating.”

[Library of Congress, 2016]

Geology

Dust Bowl

Discuss with: biology, business management, chemistry, economics, education, engineering, environmental science, ethics, government, health, history, nutrition, physics, sociology

Dust Bowl p. 152

An extreme case of soil degradation, coupled with a severe drought, led to the Dust Bowl during the 1930s.

The Library of Congress' website says,

Dry land farming on the Great Plains led to the systematic destruction of the prairie grasses. In the ranching regions, overgrazing also destroyed large areas of grassland. Gradually, the land was laid bare, and significant environmental damage began to occur. Among the natural elements, the strong winds of the region were particularly devastating.

With the onset of drought in 1930, the overfarmed and overgrazed land began to blow away. Winds whipped across the plains, raising billowing clouds of dust. The sky could darken for days, and even well-sealed homes could have a thick layer of dust on the furniture. In some places, the dust drifted like snow, covering farm buildings and houses. Nineteen states in the heartland of the United States became a vast dust bowl. With no chance of making a living, farm families abandoned their homes and land, fleeing westward to become migrant laborers.²¹



Rothstein, Arthur, photographer. Liberal vicinity, Kan. Soil blown by dust bowl winds piled up in large drifts on a farm. Photograph. Retrieved from the Library of Congress, <<https://www.loc.gov/item/2012647036/>>.

Opportunities for discussions with English, U.S. History and U.S. Government students:

John Steinbeck's book *Grapes of Wrath* is set during the Dust Bowl. This was a huge migratory event in U.S. history as those living in the states affected by the Dust Bowl left the area in search of work.

Dust Bowl: Encyclopedia of the Great Depression, 2004. From U.S. History in Context <https://goo.gl/N4KihL>



Sustainability provides interdisciplinary opportunities for teaching

Because sustainability's three-legged stool of environmental resilience, economic responsibility, and social justice touch on every course taught in a college classroom, it is naturally interdisciplinary. And oftentimes thinking across the perceived boundaries of disciplines requires the ability to step back and see the connections and critically analyze their impacts both upstream and downstream.

Learning Communities
Writing Intensive Courses



Basic understanding of sustainability in the world and the workforce.

“...much larger shares of executives at the leader organizations say their top leaders prioritize sustainability and report higher employee engagement on sustainability at every level, including CEOs, board members, and sustainability advisory committees. They report that their companies are taking more action to manage the life cycles of their products, and are four times more likely than others to say that have already implemented a life-cycle strategy.” [Bonini, 2014]

Tips from Corporate Viewpoint

Extend the product life: “...there is huge value potential in better design and in the optimization of products for multiple cycles of disassembly and reuse.”

Look to technology: “...only 36 percent of respondents say their companies are mostly or fully integrating sustainability into their data and analytics work.”

Focus your strategy: “As sustainability becomes more central to the business, companies should align internally on what they stand for and what actions they want to take on these issues....”

[Bonini, 2014]

Improve students' critical thinking skills.

“...systems thinking is indeed interdisciplinary, but coupled with more explicit attention to critical thinking, systems thinking provides for a transdisciplinary engagement; one that transcends conventional disciplinary silos.” [Reynolds, 2011]



Challenges

- ❖ Sustainability education programs for faculty at two-year institutions do not currently exist.

A two-year program that was highlighted in a 2012 Master's Thesis by Kimberly R. Criner, Ohio's Hocking College failed due to siloed academic divisions and lack of support.

Although Mountain View College has embraced sustainability projects on campus, integration across the curriculum has been arduous.

Challenges

- ❖ Lack of credit courses in sustainability (they would be only offered as electives).
- ❖ Faculty often do not see a correlation between their specialty and sustainability.
- ❖ Faculty are not convinced of how sustainability knowledge will help students in the workforce.
- ❖ Lack of time to add “one more thing” into syllabi.

Challenges

Faculty's time constraints became clear in a survey sent to 1,400 faculty members in October 2015. As a survey asked for increasing involvement, their desire to participate decreased.

- ❖ Likely to include sustainability in courses: 56%
- ❖ Likely to test faculty workbook: 42%
- ❖ Likely to attend workshop: 41%
- ❖ Likely to join cohort: 30%

Yet, 84% of respondents requested a copy of the workbook when it was finished.

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Questions?

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