# **Involving Students in Implementing a Campus Culture of Sustainability**



Madhavi Venkatesan and Julia Crooijmans

**Abstract** Courses in sustainability studies are garnering significant interest across U.S. colleges and universities and are increasingly represented in a wider range of disciplines including economics. The latter addition is consistent with the Brundtland recommendation and offers a significant opportunity to foster understanding of both the basis for present decision-making as well as the values foundation required for the shift from a consumerism-fostered culture to one of sustainable economic development based on intergenerational equity. This paper provides an overview of the Economics of Sustainability course offering at Northeastern University in Boston. Students in two sections of a same semester offering of the course were assigned to groups wherein they determined a group-based semester long project. The parameters of the project required a life cycle or cost benefit assessment inclusive of externalities and projects were specific to a current university action that could be modified to promote campus sustainability. Given that sustainability was an objective and a marketing stance of the institution, the projects, which ranged from a consignment store to local food sourcing to resource measurement and efficiency, were aligned to the publicly stated university goals and were designed to be shared with university administration and ultimately, implemented. The latter aspect provided students with both an incentive and tangible outcome that promoted their longer-term educational goals. Overall, the assignment process is one that can be replicated and offers an opportunity to incorporate a campus-based cultural orientation to sustainability within a course design.

M. Venkatesan (🖂) · J. Crooijmans

J. Crooijmans

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Department of Economics, Northeastern University, Boston, MA 02115, USA e-mail: m.venkatesan@northeastern.edu

e-mail: crooijmans.j@husky.neu.edu

#### 1 Introduction

To a large extent, the curriculum of introductory economics has maintained the theories espoused by the writers and contributors to economic thought contemporary to the discipline's Classical period. John Stuart Mill's Principles of Political Economy (1985) provided a summary of the contributions to economic thought by Adam Smith, David Ricardo, and other significant economic thinkers of the nineteenth century and became a standard text used in the study of economics into the early twentieth century. However, of note is the fact that the authors, including Mill, were relaying behaviors perceived in a society contemporary to their life and questioning aspects of the observed progress of the time, including poverty, the role of money, and the potential impact of population growth. Their thoughts were debated discussions and their frameworks were not adopted as immutable facts. Additionally, the issues discussed were similar to those of preceding Western societies, as evidenced in the moral philosophical discourses of Plato and Aristotle nearly two millennia earlier. The evaluation of the human condition within a given social and economic framework provides the challenge to economists to be both positive evaluators from the perspective that positive signifies reporting on observable and factual phenomena and normative participants, where normative requires an expression of value judgment.

Present teaching models of economics have virtually eliminated the normative aspects of assessment, reducing economics to the mathematical relationships that are addressed in absolute terms rather than in alignment with cultural attributions coincident with their development. This in large part is attributable to the work of Marshall (1920). Alfred Marshall (1842-1924) was one of the most influential economists of his time. He applied mathematical principles to economic issues, with the result that economics became established as a scientific discipline. The promotion of the market model and the inherent efficiency of supply and demand are credited to him. He promoted the perspective that the intersection of both supply and demand produces an equilibrium of price and quantity in a competitive market. Therefore, over the long run, the costs of production and the prices of goods and services tend towards the lowest point consistent with continued production. Over time, economics has become an increasingly quantified discipline. Arguably, the corresponding lack of attention to values and behavior incorporated within economic assessment has distanced the tangibility of economics to sustainability. This attribution has limited the understanding of the explanatory potential of economics and the application of economics as both a cause and a remedy of unsustainable practices.

As Nelson (1995, 139) points out, economics evaluates efficiency with respect to the "use of resources to maximize production and consumption, not by the moral desirability of the physical methods and social institutions used to achieve this end." The factors that are included in an economic evaluation are limited to the tangible quantifiable costs, and the costs are overlooked where either a market or a regulatory oversight has not provided a monetary justification. From this perspective, the impact of consumption decisions on the environment, economic disparity, or endangerment

of other species are not an issue. The market mechanism disenfranchises the consumer from the welfare of those impacted by his or her consumption and promotes the perception that price alone is indicative of the true cost of a good. Nelson (1995, 139) notes, "The possibility that consumption should be reduced because the act of consumption is not good for the soul, or is not what actually makes people happy, has no place within the economic value system." The underlying assumption is that consumers are driven to want more. As a result, economic modeling assumes that reduction in consumption in the current period is only addressed through the lens of an increase in consumption in a later period. That the assumption of insatiable want may be taught and a learned behavior, reinforced through a market model, is not even addressed in economics (Knoedler and Underwood 2003).

Beach (1938, 515) proposed, "Perhaps the most important job of the teacher in social sciences is to develop the students' power of discernment. The students must learn that one idea does not contain the whole truth; and when this is learned, the students' progress will be more rapid." The inclusion of sustainability offers students an alternative perspective on the assumptions of insatiable appetite to consume, profit maximization, and externalities as market failure. Discussion of sustainability offers a potential challenge and forces the inclusion of time in cost-benefit assessment of preferences as well as the moral and ethical issues of consumption solely for individual gratification. As Knoedler and Underwood (2003) concluded,

The alternative set of economic principles offers a foundation for a Principles course that provides a richer understanding of the real economy...Whether the instructor of Principles chooses to build his or her course exclusively around the alternative principles or instead uses them as counterpoints to introduce a multi-paradigmatic and thoughtful survey of major issues, we are certain that students will be more engaged in the subject matter while continuing to increase their capacity for critical thinking. After all, economics is the business of ordinary life, and it is time that we return to that subject matter in our Principles courses (714).

This chapter discusses the role of sustainability in teaching economics, highlighting the significance of the inclusion to the tangibility of introductory microeconomics and macroeconomics. The focus of the discussion centers on a non-traditional elective course, *Economics of Sustainability*, and a group life cycle assignment where the assignment was specific to addressing a sustainability issue or improvement on the campus of Northeastern University. The discussion provides an understanding of the rationale for the assignment and raises awareness of the significance of stakeholder participation and alignment in sustainability implementation (Breen 2010).

#### **2** Inclusion of Sustainability in Economics

Consumption is a driver of trade and is also related to the perception of human needs and wants relative to the environment. Our cultural orientation toward consumption implicitly surfaces the perception of the human relationship with the environment as either one of symbiosis or dominion (Ehrlich and Goulder 2007; Ehrenfeld 2008; Maxfield 2011; Sherman 1991).

Our present society builds on the systems established at settlement and it is evident that the perception of the environment as a resource dominates economic thought. It is embedded within our discussion of the production possibilities frontier (PPF) and our economic policy focus, in that we seek to maximize production subject to resource constraints at any given point in time. In the case of production this conforms to policy, monetary and fiscal, that seeks to maintain or establish the economy at its



peak in business cycle terms or at its potential relative to the gross domestic product (GDP) measure.

The underlying and guiding assumption of production and consumption decisions is premised on the belief that individuals in an economy have insatiable desires to consume. This assumption is reflected in the PPF when efficiency is defined as any production combination found on the PPF line. On this line, the economy is maximizing production relative to resource constraints. Combinations of agricultural output along this can only be attained by allocating the resources in a way that maximizes production. To the extent that the allocation of resources at a given point in time considers intergenerational equity and threshold extraction rates consistent with the prevention of resource depletion, and enables repopulation for renewable resources, the trade-off decisions may or may not be consistent with sustainable resource utilization. Further, to the extent that a society is taught or maintains the social norm of satiation of needs relative to that of wants, the efficient allocation of resources may not embody the maximum production related to the resources available from a long-term perspective.

In Fig. 1, the PPF line labeled Z represents a society for which insatiable wants have been embedded into the culture and the PPF represents the maximum production possible in economy-given resource availability at a given point in time. This society must rely on the identification of new resources and technology to enable future consumption or an outward shift of the PPF over time. On the other hand, the society depicted as operating on PPF A, while having the ability to attain PPF Z, would be inconsistent with full resource utilization. Society A, though representing a society that is guided by the cultural value of intergenerational equity and the satiation of needs relative to the balance of environmental and social sustainability, would be inefficient based on prevailing economic theory. The Z economy would consider A to represent an inefficient use of resources if some resources were left idle.

The PPF line labeled Z represents the maximum production possible in an economy given resource availability at a given point in time; Z also corresponds to a society for which insatiable wants have been embedded into the culture.

From a microeconomics perspective, consumption at the maximum production level, which is depicted as the highest PPF attainable, is consistent with the assumption of insatiable appetites to consume on the part of individual economic agents. On an aggregate or macro level this then is consistent with GDP maximization. In both cases an individual's consumption is based on prices, which by their present market determination exclude externalities. Prices based solely on consumption value significantly underprice production and waste stages of the product life cycle, promoting unsustainable consumption levels relative to resource use.

As depicted in Fig. 2, along a product life cycle, each step of the life cycle may have costs that are not captured in price because firms have no incentive to include costs that they do not need to address, their focus is profit maximization (investor returns) and individuals presently are assumed to be incentivized to maximize consumption subject to an income constraint—the lower the prices the more of their insatiable desire to consume that can be fulfilled. Challenging standard assumptions in economics relative to the sustainability of outcomes presently resulting from the institutional-

ization of the same assumptions, provides the opportunity to introduce alternative choices, assumptions and outcomes, prompting student discernment between social construction of theories of behavior and decision-making exclusive of asymmetric information. These elements became the foundation of a course offering, *Economics of Sustainability* at Northeastern University in Boston, Massachusetts. The course itself, mimicked the institutions' stated commitment to sustainability and students were guided through the curriculum and introduced to a methodology to assess an aspect of institutional activity specific to its sustainability. The following sections, provide a description of the course, the issues faced in the sustainability assessment, the outcome of student reflection of the assignment, and specific to the latter a recommendation for the inclusion of stakeholder engagement in sustainability studies.

#### **3** Economics of Sustainability

Economics is a social science that both influences and assesses the transformation of values into tangible societal outcomes, inclusive of social and environmental justice and economic equity. From this perspective, economics is a nexus in establishing a cultural norm of sustainability (Castle et al. 1996). *Economics of Sustainability* was designed to assist students' experience with evaluating sustainability and the impact of prevailing assumptions of market behavior, specifically as these relate to the perceived value of resources and the broader ecosystem (Costanza and O'Neill 1996; Toman 1994; Rusinko 2010; Wilson 2001).

#### 3.1 Background and Methodology

Economics of Sustainability was offered as an elective without an economics foundation prerequisite. Students enrolled in the course represented a variety of major and minor concentrations and represented students in all stages of degree completion. As part of the course offering, students were introduced to the economic concepts of supply and demand and the implicit assumptions embedded in each: the profit motivations of producers (supply) and the insatiable wants of consumers (demand). Included in the discussion were the characteristics that define supply and demand, such as, preferences and income on the part of the consumer, and resource access and production capacity on the part of the producer. In addition, students were familiarized with the concepts of marketed demand and consumerism to increase their conscious awareness that consumption decisions may not reflect need or even wants but manufactured wants stemming from marketing, advertising, and the media or cultural values that promote consumption as a leisure activity. Students were then provided with a framework for conducting a life cycle assessment (Venkatesan 2016) and were introduced to process mapping. Within the first three weeks of the course students were assigned to groups to determine a sustainability issue or solution speTable 1 Northeastern University and Sustainability

Across all dimensions of its mission, Northeastern embraces environmental sustainability as a core value. This is driven by the fact that Northeastern is a university in tune with the world—including the world's greatest global challenges

Northeastern's commitment to leadership in sustainability is manifest in all areas of operations: in how we teach our students, in how we drive our research, and in how we operate our campus. With nearly 200 courses that integrate sustainability, with expected research funding in excess of \$45 million this year, and with a pledge to reduce our carbon footprint by 80% before 2050, Northeastern's pursuit of a sustainable future is relentless

Source Northeastern University (2014)

cific to the Northeastern University campus. The alignment to the University was purposeful given the University's stated commitment to sustainability (see Table 1), it was expected that this integration would be a beneficial plan for students, administrators and other stakeholder groups. Projects included assessment of water usage, vending machine power saving, establishment of a resale store, food waste, evaluation of current coffee cup use, disposal, and alternatives, and use of hand dryers relative to paper products. Through the use of elementary life cycle analysis, students evaluated externalities and the environmental, human, and financial cost impact of current operations relative to their proposed changes. The evaluation was both qualitative and quantitative in nature and involved use of surveys and communication with external resources (e.g. vendors, consultants, university facilities).

Given that all projects were related to observable university operations, the facilities department of the university was contacted by the course instructor and appropriate personnel within the facilities organization were determined by the Vice President of facilities and her staff based on shared student project descriptions. The expectation in the providing appropriate contact was principally to increase timely response to student data requests and operational questions. However, the premise of the implementation of the communication channel was that facilities' personnel would be accessible and willing to assist given the alignment of student projects to the universities stated mission and core values.

Students were expected to assess the quantitative and qualitative life cycle cost of their project and evaluate the sustainability of recommendations relative to present operations. Sustainability of the project was assessed largely from evaluating externalities. The group project entailed three parts: outside class research and qualitative assessment of the environmental, social and health impact of the proposed project; in class discussion and presentation of the group's findings; and recommendation and a reflection paper, which addressed questions specific to the set learning outcome objectives (see Appendix 1).

The life cycle assessment included addressing the life cycle impact of the environmental, social and health impact from production to consumption to waste. Given the duration and introductory nature of this assignment, student evaluation of the life cycle impact was limited to the health impact, water footprint, and carbon footprint. Students were also provided with an Assessment Table to assist in facilitating their qualitative assessment of these factors (see Appendix 2). As in the case of all the assessments and as stated earlier, given the short duration of the assignment, students were not expected to quantify the health and environmental costs but instead used qualitative evaluation based on their research to assess the adverse impact related to the three areas of assessment: health impact, water footprint, and carbon footprint.

The reflection paper of the assignment provided students with the ability to evaluate their own decision-making pre- and post-assignment specific to their project and to assess the strengths and weaknesses in the life cycle evaluation process.

#### 3.2 Results

The reflection paper was limited to a length of three to five pages and students were directed to use APA style to format their documents, including citations and references. Additionally, grading was dependent, as noted in the assignment rubric (Appendix 3), on the quality of a student's response to the questions accompanying the life cycle project (see above; or Appendix 3).

From the student responses and as these relate to forming a culture of sustainability, the outcome of the assignment increased overall student awareness of externalities involved in their consumption decisions. However, another consistent theme throughout the presentations and reflection reporting was the disconnect between the university's externally stated commitment to sustainability and its facilities' operations data collection and interest in fostering sustainability. This aspect surfaced an alignment issue (Godschalk and Howes 2012). Employees were not incentivized to promoting sustainability and to the extent that sustainability projects originated from the student body, the transient nature of the students limited the traction of their initiatives. Additionally, data was not disaggregated or accessible making assessment of the cost benefit of a sustainability project challenging. Students used proxies available from other institutions in many case and relied on inference and conjecture.

There were eight projects involving a total of 38 students. The following is the reflection of a student who participated in a food waste assessment project.

My group focused on compositing – a method to address the growing issue of food waste – on campus. Northeastern University proudly advertises its composting efforts in dining halls and various other on campus eateries.

Our project focused primarily on food waste in the university's most popular dining hall, evaluating the sustainability of its disposal. The study included an economic analysis of composting and followed the life cycle of food waste from the dining hall to its final disposal. When analyzing Northeastern University's existing food disposal system, we looked at the holistic impact of food waste, because we believed its pledge of sustainability should not stop once waste is removed from campus. We believed that understanding the entire process could help improve current disposal methods and expand on-campus composting education to help the university reach its sustainability goals.

While trying to find proof of Northeastern University's commitment to composting and reducing waste, my group ran into a problem: there was scarce information published by the university on this subject. It seemed that the dining hall services department was either

not monitoring this data or the simply keeping it confidential. This urged us to contact the staff of Northeastern University's Dining Hall Services. Our questions concerning the university's sustainability goals and how they were being met were answered with vague replies or referrals to other staff members and external organizations. It was evident that Dining Hall Services did not prioritize its sustainability goals. To them, composting was a way of meeting a mandatory state-wide regulation. All we got out of that meeting was the name of one of the food disposal firm that Northeastern University had hired.

Throughout our research we were met with further obstacles similar to this. This opened my eyes to the lack of transparency institutions like Northeastern University have when it comes to their operations. It was disappointing to discover that our university was greenwashing.

By providing me with this hand-on investigation into the sustainability practices (or lack thereof) at my university, I discovered the problems our society and environment face today. The course made me realize that economics and sustainability need to be fully integrated to work.

All of the eight project groups reported a similar issue with respect to obtaining assistance and information from the university. In many cases, students stated that no reply communication was provided to them after emailing and calling their designated facilities' contact person.

#### 3.3 Life Cycle Assessment as an Integrated Learning Tool

The life cycle assignment as described, provided students with an ability to evaluate economic assumptions with respect to the relationship between assumptions and the prevailing economic framework, as well as the significance of consumption via a culture of consumerism with respect to economic outcomes. The most significant component of the exercise was in establishing the relationship between consumption decisions and sustainable outcomes, essentially introducing to students the responsibility inherent in consumption. From the reflection papers, all students recognized they had an ability to contribute to sustainable outcomes and all students stated that they would be more conscious of their consumption choices and their impact on the sustainability of the planet.

The assignment was designed with an expectation of making the course material more relevant to student interests by challenging assumptions of behavior to increase student critical thinking and thereby evolve individual assessment of values. The outcome of the class promoted the anticipated awareness and from the perspective of course objectives and assignment learnings outcomes was a success. However, given the single course focus on sustainability relative to the entirety of a collegiate degree program, the traction of the awareness of students may be short-lived rather than habit forming (Redman 2013). From this perspective, it is highly recommended that collegiate institutions adopt sustainability values within, at minimum, all core or required course work to ensure that students are at minimum being engaged in more than one classroom setting. Additionally, university facilities should also be aligned to sustainable outcomes (Newman 2007; Ralph and Stubbs 2014). This

attribution promotes alignment to sustainability from both active learning and passive engagement.

#### 4 Concluding Comments and Next Steps

The curriculum exercises shared provide a significant step forward with respect to the explicit introduction of sustainability through the creation of a dedicated course, *Economics of Sustainability*. The results obtained were consistent with expectations; by increasing student awareness of the interconnectivity between consumption, production, growth, and sustainability, students became better informed with respect to the significance of assessment and alignment of stakeholder groups in fostering sustainable economic outcomes. However, an unanticipated outcome and learning experience for the students was specific to the alignment of operations with a stated goal. The discussion of stakeholder incentives and alignment was not an explicit or informal aspect of the course objectives and presented an opportunity to discuss the obstacles and challenges to project implementation. Recommendations for next steps in this replicable assignment framework would be to integrate stakeholder communication and evaluation of stakeholder groups and their alignment and incentivization to a stated university sustainability goal.

# Appendix 1: Course Learning Outcomes and Assignment Prompts

Course Learning Outcomes (LO):

(LO1): Students will be able to state the relationship between culture specific to (individual) moral values and (societal) ethics and economic outcomes and will understand the significance of intergenerational social construction as it relates to existing economic systems and thought.

(LO2): Students will understand the evolution of economic thought and the influence of economic assumptions on consumption and production behavior, inclusive of ethics.

(LO3): Students will understand the significance of the attribution of "rational" to economic agent behavior and the importance of economic literacy in the attainment of rational behavior.

(LO4): Students will be able to identify externalities and identify the mechanics of market failure as they relate to sustainability.

(LO5): Students will be able to define sustainability in relation to economic systems. Students will also be able to discuss the concept of sustainability from the perspective of conscious consumption and will be able to appreciate how values fundamentally determine economic outcomes.

Additionally,

- The course will provide a foundation for further study in economics, as well as, an understanding of behavioral finance and public policy as they relate to the discipline of economics.
- The course will provide students with an ability to evaluate the significance of assumptions of behavior and how these assumptions are self-promoting and may be augmented to further sustainable outcomes.

### **Appendix 2: Assessment Table**

Students are requested to populate the table below using a scale of 1 (minimal) to 3 (significant) where scoring is based on justifiable evaluation of the impact of the beverage on the stated category and impact grouping. For example, if the beverage uses 10 gallons of water in the production of an ounce, you may view this as a 3 for the category production and impact grouping water footprint. The table will be used in the in-class group discussion and should be attached to the student reflection essay.

Project name	Water footprint	Carbon footprint	Human health impact	Natural resource impact
Production				
Distribution detail impacts specific to the distribution of the final good				
Consumption detail impacts from the point of consumer purchase to disposal				
Disposal detail impacts from the point of waste disposal; waste incineration or landfill; impact of packaging disposal-impact of recycling				

# **Appendix 3: Assignment Learning Outcomes—Instructor Evaluation**

The rubric provided below is to be used in evaluating the student reflection essay. All categories are tied to the stated learning outcomes of the assignment.

Learning outcome	Excellent Score: 4	Good Score: 3	Average Score: 2	Poor Score: 1
Recognize externalities incurred in the production of a product and relate these to the price paid for the product				
Question the sustainability of consumption choices through a life cycle evaluation that includes production, distribution, consumption and waste				
Explain the consumer's role in promoting a sustainable economic outcome				
Articulate the potential for inconsistency between incentives for the producer relative to the consumer				

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**Madhavi Venkatesan** earned a Ph.D., M.A., and B.A. in Economics from Vanderbilt University, a Masters in Sustainability and Environmental Management from Harvard University, and a Masters in Environmental Law and Policy from Vermont Law School. A recipient of a Fulbright Distinguished Lectureship (Philippines), she has contributed to numerous books and journal articles on the subject of sustainability and economics. Her present academic interests include the integration of sustainability into the economics curriculum.

**Julia Crooijmans** is an Economics major (B.Sc., anticipated date 2021) and an undergraduate student at Northeastern University. Her research interests include behavioral economics, political economy, public economics, as well as economics of education.