Developing and Implementing Sustainability Education through the Integration of Behavioral Science

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Abstract

Achieving a sustainable future requires that individuals adopt different values, attitudes, habits, and behaviors, which are often learned and cemented at a young age. Unfortunately, current educational efforts are inadequate for achieving transformative action. Even programs whose primary goal is to promote responsible, pro-environmental behaviors have largely failed at creating change among students. The lack of efficacy in sustainability-related educational programs is at least partly due to faulty assumptions about knowledge automatically leading to action, and by extension, the information-intensive methods most commonly utilized. Meanwhile, the behavioral change literature clearly highlights the need to go beyond ecological or technical knowledge when educating for transformative action, since action is motivated by much more than declarative knowledge.

In order to effectively educate for sustainability, alternative forms of knowledge (i.e., procedural, effectiveness, and social knowledge) are essential, as is the consideration of barriers and behavioral research into instructional programming. The transition towards sustainability will require action and change that is guided by an understanding of the complexities that arise within an interconnected system, as well as the ability to collaborate with people from diverse backgrounds and engage with a variety of stakeholders, while keeping an eye to the future. In formulating our approach to educating for sustainability, we incorporate three rather disparate fields (fig. 1 & 2):

i. behavioral change research
ii. sustainability scholarship
iii. educational pedagogy.

Through an integrated review of the literature in these three fields, we address the question: what educational principles and practices are most effective for sustainability, especially in terms of motivating behavior change? In answering this question, we establish a set of core principles and associated practices for best achieving transformative action through sustainability education, which can be used to guide the development and evaluation of action-oriented educational programs.

Fig. 1 Defining the Problem

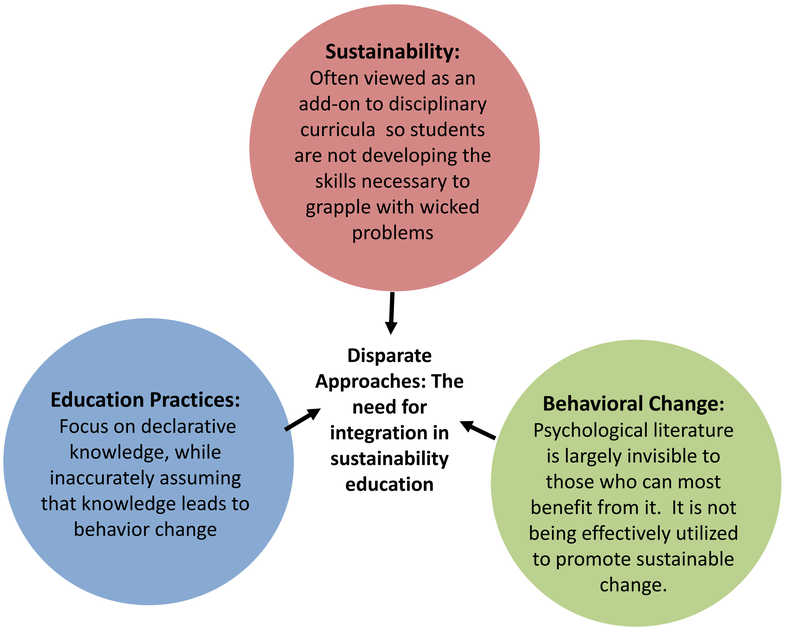
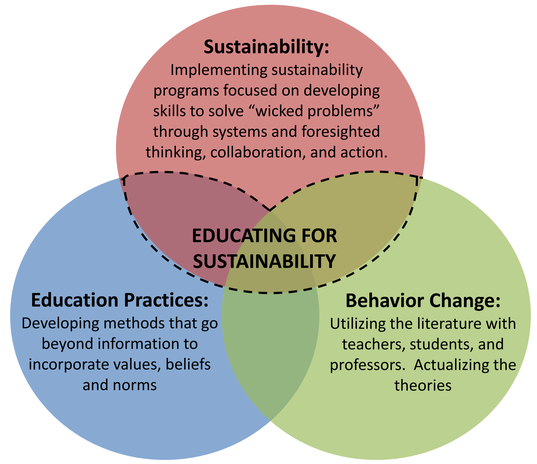


Fig. 2 Progressing Towards a Solution



Tbl. 1 Highlighting the theoretical predictors of behavior in relation to knowledge domains

Predictor of Behavior (source theory*)	Knowledge Domains
Technical information (IDM) Awareness of environmental problems (IDM) Mechanical understanding of issues (IDM)	Declarative: Understanding of how environmental systems function
Process-oriented 'how to' information (IDM, MREB) Structural influences & limits (VBN, CBSM) Situational constraints & opportunities (VBN, CBSM)	Procedural: Awareness of how to undertake particular actions
Locus of control (VBN, MREB, TRA, CBSM) Perceived consequences (VNB) Attitudinal evaluations of outcome (TRA, TPB)	Effectiveness: Views of the outcomes of different behaviors
Ascribed responsibilities to self & others (MREB) Perceived social pressures/norms (TRA, TPB) Perceptions of what is common (CBSM) Perceptions of what is dis/approved (CBSM)	Social: Awareness of the motives and intentions of other people or society

*Information Deficit Model=IDM, Value-Beliefs-Norms=VBN, Theory of Reasoned Action=TRA, Theory of Planned Behavior=TPB, Community-Based Social Marketing=CBSM, Model of Responsible Environmental Behavior=MREB

Tbl. 2 Summary of Key Principles, Practices, and Knowledge Domains for Sustainability Education

Sustainability Competencies	Educational Pedagogy	Predictor of Behavior (knowledge domain, source theory)
1. Systems thinking and an understanding of interconnectedness	Concepts: Integrate the environment, economy, and society, including impacts, trade-offs, feedbacks, and unintended consequences Methods: Create real-world learning lessons and activities that take an interdisciplinary approach to problem-based learning Avoid 'assembly-line' fragmentation of subjects and viewing solutions to problems as simply right/wrong or true/false	Technical information about real-world problems in specific places, including actual impacts of actions (declarative) Emphasizing the aggregate impact of private-sphere behaviors (effectiveness) Altruistic & biocentric values emphasizing benefits for and interconnections among people and nature (social)
2. Long-term, foresighted thinking	*Concepts*: Foster inter-generational equity *Methods*: Visioning exercises, forecasting & backcasting activities Avoid overly simplistic, one-pronged solutions	Valuing the future, emphasizing intergenerational equity (social) Developing sense of responsibility for future (social)
3. Stakeholder engagement and group collaboration	*Concepts*: Democratic decision-making, pluralism, intra-generational equity, and transdisciplinary perspective *Methods*: Community service-learning Role-playing activities/mock citizens jury Group projects/presentations Participatory decision-making Avoid evaluating solely on individuals' outcomes and promoting competition amongst peers	Development of pro-social atmosphere (social) Knowledge about how to engage in collaborative, community-based activities (procedural) Valuing multiple perspectives (social)
4. Action-orientation and change-agent skills	*Concepts*: Focus on transformational action, civic and community engagement *Methods*: Experiential lessons: project-based learning, community service-learning, and place-based activities Commitment pledges Avoid solely informational learning	Develop the knowledge regarding how to participate (procedural) Build student's confidence to participate (effectiveness) Develop a positive association with environmental citizenship (injunctive/social) Commit publicly to taking action and creating change (descriptive/social)

Data Collection Methods:

1. Extensive survey of Phoenix Metropolitan High School students (~100)
   Purpose: Linking knowledge domains to behaviors and determining motivations and barriers to change within in our target population
2. Program participant surveys (pre and post ~30 student participants)
   Purpose: Evaluate the impact of the two week program. Access which knowledge domain areas have changed significantly and which activities were most engaging
3. Participant Observations (~30 students)
   Purpose: Assess level of engagement as well as noting most commonly stated barriers to change
4. Teacher Interviews- these teachers are enrolled in the Model-It STEM master's program at ASU and will be interning with our pilot program
   Purpose: Evaluate barriers to implementing sustainability education in traditional K-12 schools.
5. Student Participant Interviews & household members (~8-10 students)
   Purpose: Evaluate long-term behavioral change due to program intervention. Held at participants' homes for visual confirmation of changes.

Applying the Framework

Study Area: ASU campus, Tempe, AZ
Program Focus: Urban sustainability
Program Details: 30 high school students will participate in a two week program where they will explore sustainable change and develop methods for reducing their ecological footprints

Image source: http://fatknowledge.blogspot.com/2007/06/ecological-footprint-of-food-items.html