

What Does GREEN Really Mean?

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VEXATION

At my institution, we call ourselves the *Green* University because of our school colors, because we are a land-grant Aggie school, and because there is an administrative commitment to becoming “carbon neutral,” reducing energy use, supporting alternative forms of transportation to/from campus, becoming less paper-dependent, etc. We were even named one of the greenest US universities by *Newsweek* magazine last year. We’ve all likely heard plenty about *green* initiatives, including from President Obama. We read advertisements for products that promise to be *green* or use *green*-efforts in their manufacturing processes. We discuss how *greening* efforts will lead to more sustainable practices. *Green, green, green*—what does it really mean?! I am vexed (well, more perplexed) by the throwing around of the word, “*green*” without a clear definition of this behavior/lifestyle, as well as the potential for it to be confused with *being ecologically literate*.

Science educators must ensure that students of ecology make a distinction between understanding ecological concepts and having *green* attitudes. Subsequently, we must educate students to recognize that *green* attitudes do not necessarily result in *green* (sustainable?) behaviors. *Green* is not an ecological concept; however, it is a term that is conflated with *ecological understanding*. Currently, there are individuals from both the education and ecology “silos” who are grappling with ideas and strategies of defining (and then measuring) ecological literacy. These varying definitions range from purist definitions that ecological literacy refers only to the understanding of ecological concepts that do not necessarily include human impacts on the environment (Slingsby, 2001) to those that are much broader and refer to human behaviors that indicate understanding of sustainability (Orr, 1992). Roth (1992) uses the term “environmental literacy,” for which the recognition of human impacts on ecosystems is central. In fact, some researchers measure ecological literacy through so-called sustainable behaviors that people exhibit (Bruyere, 2008). Berkowitz (2007) uses the term “ecological thinking,” which combines ecological understanding and environmental awareness. This new term begs the question, “is someone who uses ecological thinking then *green*?”

Not only are there variations of the definition of ecological literacy, there is a lack of consensus on how to measure it. Simple survey tests miss the complexities of measuring multidimensional literacy and personal decision-making (Uno & Bybee 1992); however, currently this is what some ecologists use (Stamp, 2007). If we measure values and attitudes, we cannot escape placing more or less value on what other people value (Bruyere, 2008). If we measure behavior (such as using ecological footprint calculators), how can we maintain sensitivity to the worldview and context of our research subjects? For example, prescribing simple actions that can reduce one’s ecological footprint may not be culturally relevant for some populations (such as recommending less meat consumption when some populations do not consume meat for financial or cultural reasons). I argue that it is important to develop a measure that can be used by researchers/teachers/ecologists as they study different populations, either within or outside of the United States.

Central to biological and ecological research is the concept of emergent properties. When systems are capable of functions that the individual components of which are not, they are said to exhibit emergent properties. For example, ecosystems function as microcosms, generating and using energy in ways that individual components (both abiotic and biotic) of the system could not, if isolated. Likewise, when ecologists, teachers, and science education researchers convene for inclusive conversations, then only can emergent properties regarding their commitment to helping educate more ecologically literate citizens be identified. Putnam (2000) explained that when individuals in social groups work and share information in a reciprocal fashion, then only can social capital be appreciated. By drawing on emergent social capital, I posit that collaborative efforts of science educators and ecologists will result in constructive definitions and measures of ecological literacy that have not emerged when these groups work in isolation. Together we can define ecological literacy and *green*.

VENTURE

Unsatisfied with the inconsistent explanations for ecological literacy, my colleagues (A. Wallace, systems ecologist, and S. Dahlberg, environmental scientist) and I (physiological ecologist), all science teacher educators, constructed our own definition of “ecological literacy” that states that an ecologically literate individual can recognize the relevance and application of ecological concepts to understand human impacts on ecosystems (Balgopal & Wallace, 2009). To bridge the worlds of ecology, environmental science, and science education we use a “Dilemma-Decision” framework to measure ecological literacy in middle school, high school, and college level science courses. We argue that if our students are able to describe a personal ecological dilemma to us, they must be able to justify why they are troubled by certain human behaviors, as well as the effects that it has on ecosystems. In writing, they must be able to use ecological evidence to justify why decisions that they/others make have ecological consequences. By asking students to describe their dilemma after reading and discussing an ecological “crisis” (using what they know and feel) and then their decision (to act or not act), we try to determine if they have an understanding of the ecological concepts driving their decisions. We code student discourse using the following framework; authentic students are best able to use ecological evidence to justify ecological consequences of human behaviors.

	▲	Cognitively distant	Cognitively close
Affectively close		Subjective	Authentic
Affectively distant		Superficial	Objective

It is our intent to be culturally sensitive by using this form of assessment. Some students tell us that they will try to educate others (exciting news, since some of them are pre-service teachers), others want to get involved in policy making efforts; however, there are several who are content with blaming others and not willing to change their own behaviors. It is not our primary goal to change attitudes, rather to enhance conceptual understanding, yet I am still left with the questions:

- Is the Dilemma-Decision framework sufficient in allowing students to share their thoughts in a safe/just manner (in which the instructors/researchers are not judging the students and allowing for cultural perspectives to be included) yet still measuring ecological understanding?
- How can we help instructors use this assessment framework so it is used consistently, or does that not matter? (we combine it with other quantitative assessment tools)