

## “Greening of Education” --Ecological Education General note for all Greening Courses

- Broadening the student’s education without compromising the student’s competence in the area of specialization;
- Educating all students to this objective, recognizing that our population of students is increasingly diverse;
- Ensuring environmental, ecological<sup>1</sup> and ethical literacy in the context of decision making;
- Ensuring that we state and explicitly address what integrity means in the context of the whole of life; and
- Nurturing a culture of continuous assessment and improvement.

These are the goals we set forth in our statement on “Broadening the Carnegie Mellon Education” as a strategic priority<sup>2</sup>.

The main aim of the “Greening” (Luce Foundation) Project is to make ecological education a part of the Carnegie Mellon education. David Orr’s books, *Earth in Mind* and *Ecological Literacy*<sup>3</sup> discuss in elegant detail the six principles of an ecological education. “All education is environmental education”, he cites as his first principle in the essay, “What is Education for?” in *Earth in Mind*. “By what is included or excluded, students are taught that they are part of or apart from the natural world. To teach economics, for example, without reference to the laws of thermodynamics or ecology is to teach a fundamentally important ecological lesson: that physics and ecology have nothing to do with the economy. It just happens to be dead wrong. The same is true throughout the curriculum.” (page 12). His other principles are: “education as the mastery, not of subject matter, but of oneself”, “knowledge carries with responsibility”, “understanding the effects of knowledge on real people and their communities”, “importance of ‘minute particulars’ and the power of examples over words”, and the “importance of process for learning”.

In the Greening Education project we want to make education ecological in the broadest sense-- by inviting students towards knowledge of the self, of the environment, of the underlying principles, and the processes of learning and doing and understanding. This is to happen in the context of the different subject areas they are being taught early in the curriculum, so that this ecological knowledge is integrated into their thinking as they progress through their specialized learning in the subject areas. Understanding has been defined beautifully by Wiggins and McTighe in *Understanding by Design*<sup>4</sup>. When we truly understand, they write, we (1) can explain, (2) can interpret, (3) can apply, (4) have perspective, (5) can empathize, and (6) have self-knowledge (page 44). It is

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<sup>1</sup> ecological" has a broader sense here than its usual narrow, technical meaning. Ecology is used here to mean the inter-dependent system consisting of the components and structures of the university and related environment, relationships between these and patterns of behavior encouraged or inhibited by these. [Susan Leigh Star, *Ecologies of Knowledge*, State University of New York Press, 1996]

<sup>2</sup> <http://synergy.as.cmu.edu/vpeducation/strategic/>

<sup>3</sup> David W. Orr, *Earth in Mind: On Education, Environment and the Human Prospect*, Island Press, 1994; and, *Ecological Literacy: Education and the Transition to the Postmodern World*, State University of New York Press, 1992.

<sup>4</sup> Grant Wiggins and Jay McTighe, *Understanding by Design*, Merrill-Prentice Hall, 1998.

uplifting to think that each of the courses we teach can be the grounds to make this happen.

To plan a course around this thinking, we would like to see the Greening courses include three very general features that can form foundations for ecological thinking.

- (1) Systems thinking –connections and influences between ideas, people, and communities<sup>5</sup>
- (2) Life cycles and respect for the role of time in nature, human activities, and our lives
- (3) Self as agent and knowledge and uncertainty as a basis for decision making

Each Greening course may approach these in different ways, and this aspect of seeing the concepts in diverse contexts and with diverse approaches can be a powerful pedagogy<sup>6</sup>.

As part of the project, we will develop a website that describes each course, and adds teaching notes and observations. One theme of the course report will be discussions of how the course incorporates the above features. The website will serve as a progress report to ourselves and the Luce Foundation, and ideally, provide models for others who wish to adapt this to their courses. We will also meet once a month to share ideas and observations and report on what is happening.

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<sup>5</sup> In his book, *The Web of Life*, Capra describes six characteristics of ecological systems. Each of these properties have to be understood and acknowledged in systems-level thinking. We list below the properties and their characteristics.

1. Networks : Interdependence, diversity, complexity
2. Boundaries : Scale and limits
3. Cycles : recycling of resources and partnership
4. Flow-through : Energy and resources
5. Development : succession and co-evolution
6. Dynamic balance : self-organization, flexibility, stability, sustainability

<sup>6</sup> <http://telstar.ote.cmu.edu/environ/> may be a useful website. It is the website for our course, “Science and technology for the Environment”. In particular, the site has discussions of teaching systems thinking including the use of concept maps.