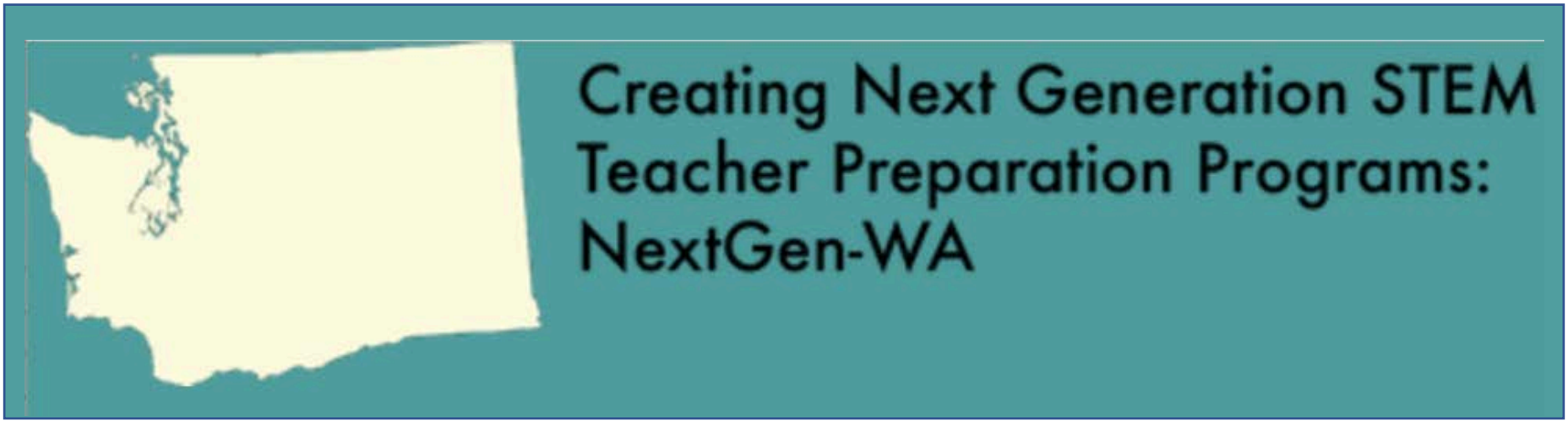

Education for Sustainability Working Group
Curriculum Development Workshop Series

How best to incorporate EfS into a Marine Biology "capstone" course for WSU Vancouver Biology and Environmental Science majors?

Gretchen Rollwagen-Bollens
Associate Professor
School of the Environment

Vision Identified by the EfS Working Group

Throughout their undergraduate program, pre-service teachers in Washington State engage in integrated learning experiences that build knowledge, skills, and dispositions to incorporate sustainability principles into their K-12 teaching.

Mission Identified by the EfS Working Group

- Integrate EfS principles across undergraduate courses in multiple colleges
- Increase teachers' capacity to help students meaningfully address real-world challenges
- Collaborate across informal and formal education
- Communicate across K-16

Goals for the EfS Working Group

- **Goal 1:** Develop a framework of guiding principles for sustainability education
- **Goal 2:** Identify, develop, and disseminate context-based, field-tested models
- **Goal 3:** Support the adoption of the EfS framework and associated pedagogies by undergraduate faculty

EfS Framework for Teacher Preparation

1. Content: Developing Sustainability Literacy

- Thematic or transdisciplinary and place-based curriculum
- Connected to learners' experiences, values, and beliefs
- Socio-cultural, economic, ecological factors are interconnected
- Action-oriented
- Connects EfS principles to K-12 disciplinary standards

2. Process: Civic Responsibility Through Active Participation

- Students build civic responsibility through active participation in local contexts and change-oriented actions
- Education students integrate EfS principles into K-12 curriculum and align with K-12 standards (e.g., NGSS, CCSS-M, EfS)

Largely based on Burns (2011) Teaching for Transformation: (Re)Designing sustainability courses based on ecological principles. *Journal of Sustainability Education*, Vol. 2

3. Context: Connection with Geographic Place and Community

- Opportunities to connect scientific, cultural, economic, political, educational, and other knowledge from university courses to local community contexts
- Learning experiences help students develop intrinsic value for environment
- Education students enact place-based, interdisciplinary EfS lessons and units

4. Perspectives: Critical Thinking through Diverse Perspectives

- Undergraduates are provided with safe opportunities to critically examine and reconstruct beliefs and values, question paradigms, and explore diverse perspectives
- Education students consider intersections and disconnections in local values and EfS principles

Important “take aways” for me from Burns (2011)…

- The ultimate purpose of the Burns model of sustainability pedagogy is to serve as a tool for designing education that **empowers and inspires learners to be able to solve complex problems** and make changes that **regenerate and sustain places and communities**.

- …sustainability pedagogy is inherently focused on change, and **making change requires engagement with one’s self, with others, and with places**.

- In order for engagement to take place, effective **sustainability pedagogy must be rooted in the place where learning is happening**. Place-based education not only helps learners understand who they are, but to value the places they live and thus to value themselves within that place.

- The intention is that **students become empowered and transformed** when learning in a way that is thematic, critically questions dominant norms and incorporates diverse perspectives, is active and participatory and is grounded in a specific context.

- The development of a course should **optimize learning rather than maximizing**, understanding that in the case of learning sustainability, less can often be more.

Ultimately…

Students' learning experiences must allow them to develop the leadership capacity to be able to:

- Understand and address complex sustainability problems holistically
- Have the ability to ask critical questions and understand diverse perspectives
- Participate in finding solutions
- Develop personal connections to the places in which their biological, social, and economic lives are grounded.

Brundiers et al. (2010) Real-world learning opportunities in sustainability: from classroom into the real world. *IJSHE* Vol. 11(4)

Years 1 and 2 in Arizona State University's School of Sustainability:

- Students are required to identify a real-world problem
- Evaluate whether and why it is a sustainability problem
- Perform a stakeholder analysis,
- Formulate a problem-solving approach (what, why, how, who).

Wiek et al. (2011) Key competencies in sustainability: a reference framework for academic program development. *Sustainability Science* 6: 203-218

Having the skills, competencies and knowledge to enact changes in economic, ecological and social behavior without such changes always being merely a reaction to pre-existing problems.

Key Competencies in Sustainability

Systems-thinking competence
the ability to collectively analyze complex systems across different domains (society, environment, economy, etc.) and across different scales (local to global), thereby considering cascading effects, inertia, feedback loops and other systemic features related to sustainability issues and sustainability problem-solving frameworks.

Anticipatory competence
the ability to collectively analyze, evaluate, and craft rich ‘‘pictures’’ of the future related to sustainability issues and sustainability problem-solving frameworks.

Normative competence
the ability to collectively map, specify, apply, reconcile, and negotiate sustainability values, principles, goals, and targets. This capacity enables, first, to collectively assess the (un-) sustainability of current and/or future states of social-ecological systems and, second, to collectively create and craft sustainability visions for these systems.

Strategic competence
the ability to collectively design and implement interventions, transitions, and transformative governance strategies toward sustainability. (be able to get things done)

Interpersonal competence
the ability to motivate, enable, and facilitate collaborative and participatory sustainability research and problem solving. Includes advanced skills in communicating, deliberating and negotiating, collaborating, leadership, pluralistic and trans-cultural thinking, and empathy.

Biology 485 [CAPS]
Biology of the Oceans

Biology 485 [CAPS]
Biology of the Oceans
Spring 2021

3 credits

Juniors/Seniors

BS Biology and BS Earth & Environmental Science majors

Tues (synchronous) & Thurs (asynchronous) 2:55-4:10p

Students who successfully complete Biology 485 will be able to:

- Describe and understand the function of the major groups of marine organisms.
- Understand the composition, function and ecological importance of marine ecosystems.
- Understand the role of humans in altering ocean ecosystems, as well as protecting and conserving ocean resources.
- Educate peers and the general public about marine biology and conservation in the Pacific Northwest.

Course structure

- **Introductions**
  - To course
  - To each other
  - To Marine Biology as an area of study

- **Foundational Topics for Marine Biology and Conservation**
  - Principles and goals of and marine conservation
  - Geological, physical, and chemical bases of the marine environment

- **Marine Organisms and Biological Processes**
  - Producers (phytoplankton phytobenthos
  - Primary Productivity
  - Consumers (zooplankton, fish, marine mammals)
  - Feeding behaviors and experimental approaches

- **Conservation of Marine Ecosystems**
  - Ecosytem structure (open ocean, intertidal, estuaries, etc.)
  - Conservation issues (fisheries, harmful algal blooms, ocean acidification, etc.)
  - Group work days and final presentations

- **Final project**

Final Project Assignment

Develop, research, and produce (via written report or in another medium, as approved by GRB) a product that informs, educates, and engages the residents of Washington about a regional marine biological resource, including a plan for improving the sustainability of that resource.

The focus must be on a Pacific Northwest (WA, OR, BC, AK) marine organism, community or ecosystem.

Preliminary scaffolding assignments

- Short assignments asking students to identify important challenges in marine conservation from reading assignments
- List marine organisms and marine environments in the PNW that they are personally interested in
- Find initial web-based resources about their “favorites”
- Write out a 1-2 sentence description of a theme that emerges from their ideas generated so far.

Final Project Assignments

- Submit ~3-page Proposal for their final project (due March 15)
- Meet with GRB at least once one-on-one to discuss
- Meet with small group of students at least twice to discuss progress and share ideas
- Submit draft of product
- Present brief oral or poster presentation of their project for students in the class
- Submit final product by May 4.

My questions:

- Is there enough “sustainability” in this assignment?
- How can I better link to the key competencies of sustainability?
- What approaches would best engage and prepare future teachers?
- Best way(s) to assess the final product?

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