Redesigning an Interdisciplinary Food Course from a Systems Thinking Perspective

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Introduction | Food, Ecology, and Globalization

- Taught from 2011-2015 as a broad survey course for science and non-science majors with a focus on the factors that influence food choice and the implications of those choices at many scales.
- Redesigned in 2017 & 2018 to integrate an interdisciplinary perspective on food with a systems thinking lens and turn the following recurrent challenges in the course into opportunities:
  - Students’ varied academic backgrounds
  - Limited process skills such as critical thinking, in many students
  - Students’ difficulty making connections between course content elements, e.g., links between climate change and agriculture

The four main areas of focus for the redesigned course:

### Aim 1
Build skills in critical thinking (CT), evaluating claims & assessing evidence

- Students showed improvement in CT skills as demonstrated in the sequence of claims assessment assignments; in the biotechnology course unit; and in their final projects.
- Journal entry quotes:
  - “The course taught me not just topics to think about, but how to think critically and assess claims, in a pedagogical and practical manner”
  - “The journaling process for these claims assessment assignments was one of the better formative learning experiences I have had”

### Aim 2
Build skills in systems thinking (ST)

- Analysis of conceptual change over 3-part assignment: Stylized Model. Arrows indicate significant differences (green/increase, red/decrease, p <0.10) from paired sample t test comparing a sub-sample of students models (Part I vs Part II and Part II vs Part III) in terms of structural metrics of the models.
- Journal entry quotes:
  - “I really enjoy the multi-disciplinary approach of ST. It is really cool to be able to learn about so many different facets of one complex system.”
  - “I would like to continue exploring the concept of ST and apply the skills I learned to my professional and academic work.”

### Aim 3
Shift to a pedagogical approach where students review preparatory material prior to class and work in small groups in class to deepen their understanding

- 100% of students showed improvement in their pre and post assessments: “It was really helpful to assess my baseline knowledge before watching the information-packed biotechnology video; and satisfying to correct my answers in the post assessment.”
- “This is a great class for practicing working in groups.”
- “I appreciated your providing choices in the assignments for those of us with less training in the sciences.”
- “This is by far my favorite class that I’ve taken at Columbia…. I liked the mix of lectures, group work, readings, and mental mapping.”

### Aim 4
Accommodate and embrace different levels of content knowledge

- 45 students
- 20% Students Majors/MA programs
  - Biology
  - Biochemistry
  - Conservation Biology
  - Environmental Biology
  - Evolutionary Biology
  - Sustainable Development
- 80% Student Majors/MA programs
  - Sustainability Management
  - Urban Studies
  - Anthropology
  - Science Journalism
  - Political Science
  - Business Management
  - English Literature

Next Steps

The results from this redesign will inform several initiatives to rethink food systems pedagogy, including:

- A Community of Practice on integrating ST into food systems teaching
- A NSF-funded initiative to research ST learning progressions and assessment dimensions
- Open-access teaching resources developed through the Network of Conservation Educators and Practitioners

Further information

- Network of Conservation Educators and Practitioners (Center for Biodiversity and Conservation at the American Museum of Natural History) https://ncep.amnh.org/
- Mental Modeler software: http://www.mentalmodeler.org/

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