Preparing Students for Interdisciplinary Collaboration and Team Research: Case Studies and Models from the Graduate and Undergraduate Level

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Building Undergraduate SciTS Programs: Lessons from PPE

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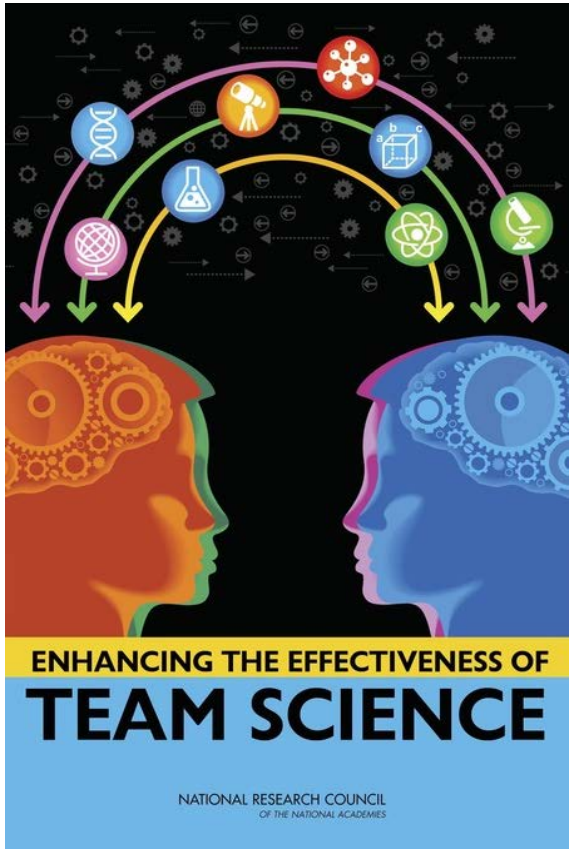
Undergraduate SciTS: A Blindspot?



Uses of ‘undergraduate’: 11

Uses of ‘undergraduate’ in bibliography: 4

Only two paragraphs on the topic (p. 119)

Only three studies discussed

All of these were on interdisciplinarity generally, not on SciTS specifically

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Undergraduate SciTS: A Challenge

What might undergraduate SciTS pedagogy look like?

One-off workshops (e.g., TDI workshops)?

Interdisciplinary seminars?

Research opportunities?

Why not a certificate program, or even a degree program, such as a minor or even a major?

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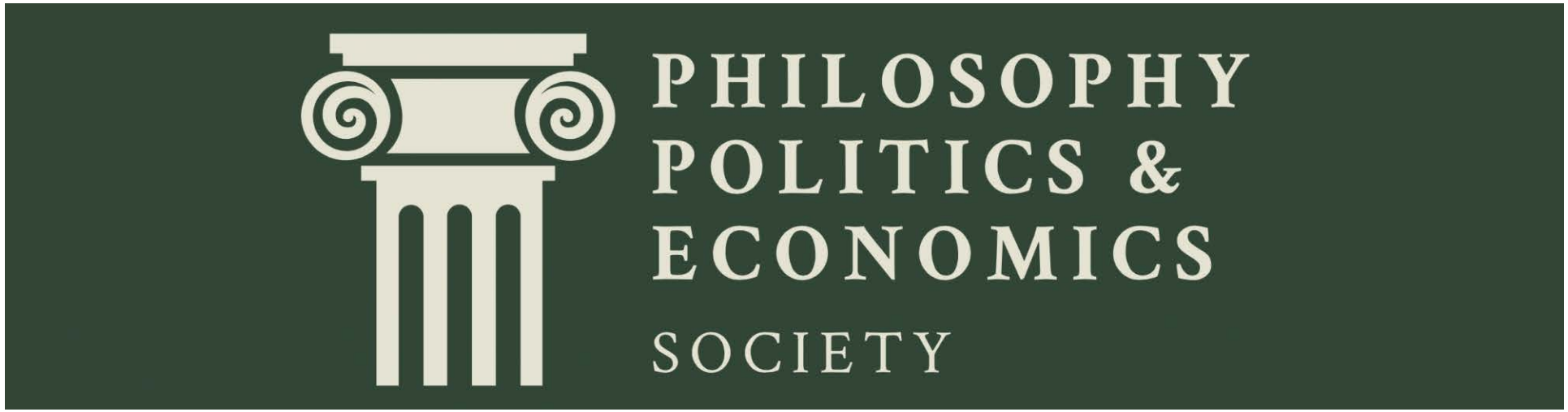
A SciTS degree? The model of PPE



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A SciTS degree? The model of PPE

PPE at the University of North Carolina, Chapel Hill

15 Credit Minor

Introductory courses in each of the three disciplines

Gateway course + Capstone course

PPE at the University of Idaho

22-24 Credit Minor

Introductory + upper level courses in each of the three disciplines

Gateway course

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A SciTS degree? The model of PPE

The key to selling PPE to adminstrators:

The promise of returns that require minimal institutional investment

The example of the University of Idaho:

Only one new course needed (the Gateway)

All introductory courses and most upper-level courses satisfy general education requirements

The minor has immediately built itself

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A SciTS degree? The model of PPE

How to build a SciTS minor

1. Design a Gateway course and curriculum

    Publishing opportunity!

2. Build a program curriculum

    Don’t reinvent the wheel – many interdisciplinary science degrees already exist

    Leverage existing programs

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A SciTS degree? The model of PPE

How to build a SciTS minor

1. Design a Gateway course and curriculum

2. Build a program curriculum

3. Think hard about assessment

    If possible, design a capstone course of activity (perhaps a team science research project) and assess that

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A SciTS degree? The model of PPE

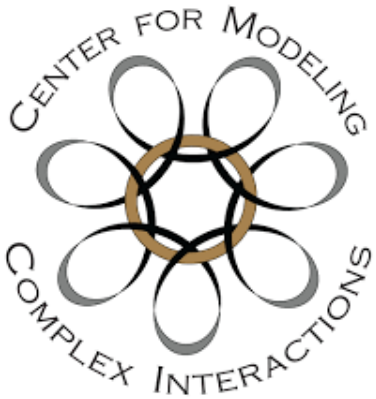
How to build a SciTS minor

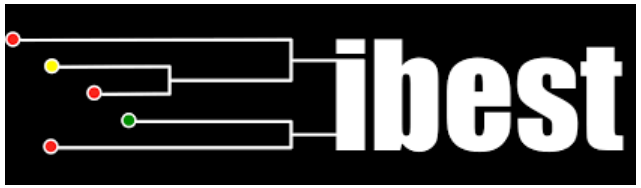
1. Design a Gateway course and curriculum

2. Build a program curriculum

3. Think hard about assessment

4. Find institutional allies





A SciTS degree? The model of PPE

How to build a SciTS minor

1. Design a Gateway course and curriculum

2. Build a program curriculum

3. Think hard about assessment

4. Find institutional allies

5. Bring the students to the SciTS Conference!

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Cultivating Interdisciplinary Competencies at the Graduate Level: An Ethics-based Curriculum for Environmental Team Science

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Outline

What is the Toolbox Dialogue Initiative?

TDI as an education and training tool for addressing team science competencies

Example Curriculum: Values and Responsibility in Interdisciplinary Environmental Decision-Making

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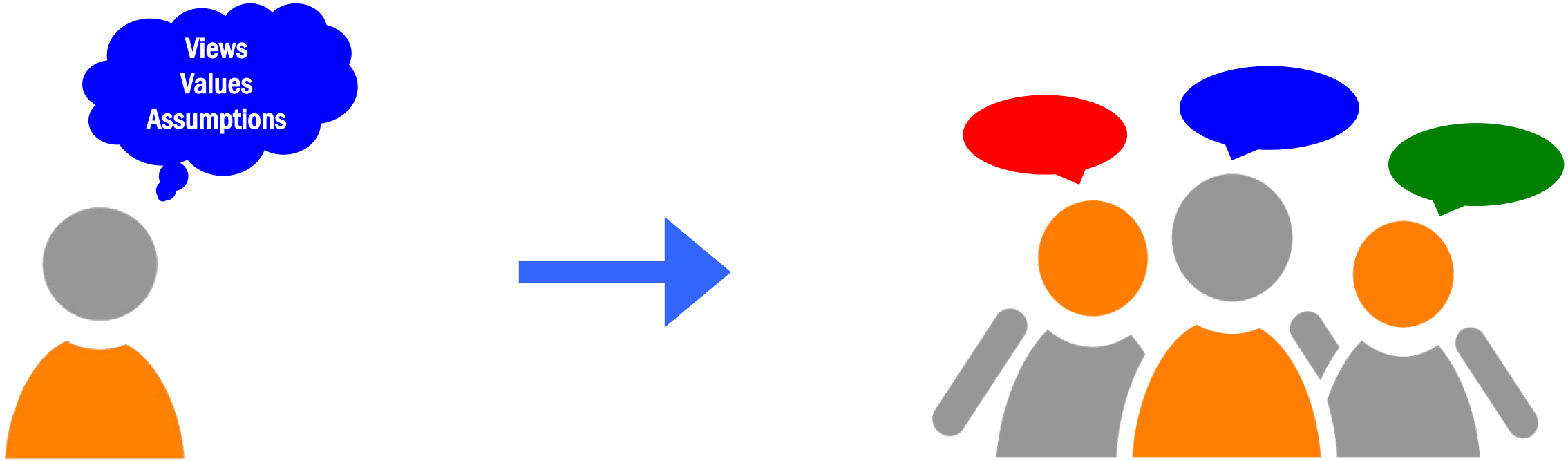
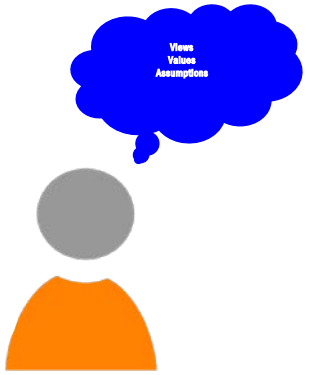
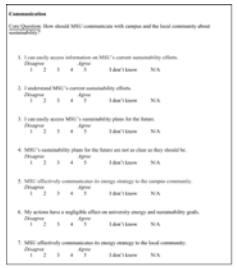
The **Toolbox Dialogue Initiative** aims to **enhance** communication and collaboration in cross-disciplinary partnerships through **philosophically structured**, **dialogue**-based **workshops.**



Primary Goals

1) *Identify habits* that guide research, influencing it in ways that can reflect differences in concept and value that are grounded in training and experience.
2) *Share habits* be articulating them and subsequently enabling the collaborators to learn more about how they operate.
3) *Coordinate habits* by harnessing the differences among them through dialogue, negotiation, and compromise.





300+ workshops around the world

TOOLBOX DIALOGUE INITIATIVE™

21 U.S. states and territories, 10 countries

Education & Training

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30% (~105) of all workshops have been conducted with graduate or undergraduate students as part of a class, fellowship or internship training

1144+ participants

Academic:
Arts & Humanities, Life Sciences, Natural Science, Education, Business, Social & Behavioral Sciences, Medical & Health Sciences, Physical Sciences and Mathematics, Engineering, and Law

Our Impact

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89% better understand how **others think**

81% said helped identify **own research worldviews**

74% agreed it improved **group communication**

64% agreed it improved **group collaboration**

77% now feel more capable of **collaborating** with people from other fields

75% are better able to identify **research worldviews** expressed by other people

70% have a better idea about how to **communicate** with people **from other fields**

48% say my own way of **thinking about research** has changed since being in TDI

Results from an independent evaluation carried out by the Western Michigan Evaluation Center (2017)

Past participants remarked on their new attitudes and understanding after the workshops.

I am more convinced that research is about mutual understanding…

I have more confidence to talk about research and collaborate with researchers in fields outside of [my own].

This has helped me understand and communicate with researchers on collaborative projects.

I have since developed an interest in collaborative problem formulation.

TDI and Team Science Competencies

1) *Self and team awareness (reflexivity)*
2) *Exchange (perspective seeking)*
3) *Coordination*
4) *Epistemic humility*
5) *Adaptation*
6) *Collaboration*
7) *Mutual understanding*
8) *Resilience*

The Curriculum Online

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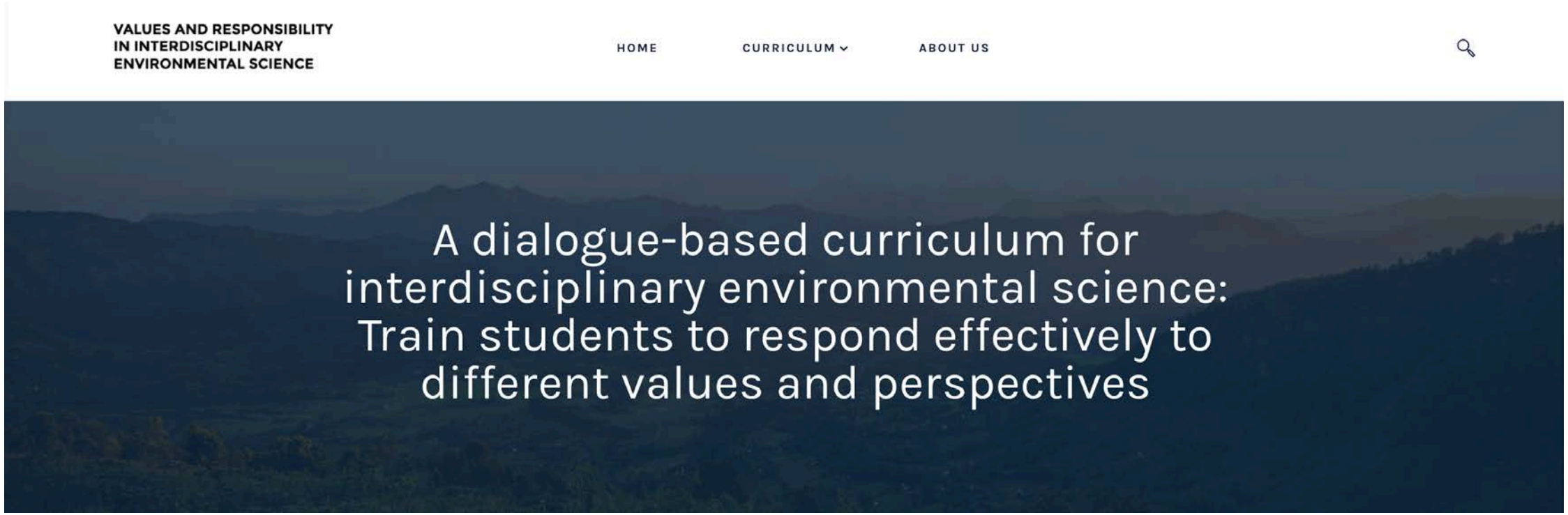

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The Project Context

Curriculum is informed in its design by a national e-survey that focused on ethics and values in interdisciplinary environmental science (n=480) (Hall et al. 2017)

Results: *Programs should*

- Address values in applying science to policy and management decisions
- Engage students with issues related to norms of scientific practice
- Train students to manage value conflicts among different stakeholders
- Integrate ethics instruction into existing courses with case studies or problem-based learning

Curriculum Goals & Objectives

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Goal: create a curriculum that enables graduate students to reason more effectively about values and policy in their interdisciplinary contexts

Objectives:

- Enable students to identify values and policy dimensions as they manifest differently across their disciplines
- Design a structured yet flexible curriculum that enables instructors to utilize different course modules in different contexts

Learning Objectives

Self and team Awareness

Exchange

Coordination and collaboration

Learning Objective 1
Describe the ethical challenges of risk, expertise, non-human impacts, and policy constraints in relation to their interdisciplinary environmental science field

Learning Objective 2
Recognize risk, expertise, non-human impacts, and policy constraints in case studies related to their interdisciplinary environmental science area

Learning Objective 3
Assess how risk, expertise, non-human impacts, and policy constraints should affect their own conduct as practitioners in the interdisciplinary environmental sciences

Learning Objective 4
Identify and analyze differences and similarities among the perspectives of multiple environmental science disciplines on risk, expertise, non-human impacts, and policy constraints

Learning Objective 5
Formulate dialogue prompts that apply the broad concepts related to values and responsibility in interdisciplinary environmental science, including risk, expertise, non-human impacts, and policy constraints, to each student's particular research and practice specialty

Learning Objective 6
Articulate and discuss their perspectives on risk, expertise, non-human impacts, and policy constraints in interdisciplinary environmental science with other members of the course

Learning Objective 7
Produce a project that applies knowledge of the values and responsibility dimensions of interdisciplinary environmental science to a problem in one's own research or practice domain*

Stages of the Curriculum

- *Introductory lecture* – introduce the four themes (risk, policy constraints, non-human impacts, and expertise)
- *Localizing discussion* – think about values and policy dimensions in their context, being sensitive to disciplinary differences
- *Case studies* – use cases related to the theme of the course (e.g., water resources) to render more concrete their sense of the values and policy issues as well as disciplinary differences
- *Construction of dialogue prompts* – identify specific values and policy issues and articulate them as dialogue prompts
- *Dialogue* – use the prompts in dialogue
- *Debrief* – discuss what was learned

Structured Dialogue

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Expertise #1 Module

Expertise #1

Core Question: Who should participate in the research phase of interdisciplinary environmental science?

1. To have relevant knowledge for interdisciplinary environmental science, people must have formal academic credentials.

Disagree *Agree*
1 2 3 4 5 I don't know N/A

2. Experts who are not academics, such as indigenous elders, have knowledge that should impact interdisciplinary environmental science research.

Disagree *Agree*
1 2 3 4 5 I don't know N/A

Instructor & Student Toolkit

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Instructor Toolkit

- 3 hour and 6 hour lesson plans
- Suggestions for modification and class prep
- Example case studies and resources for finding other case studies
- Instructions on drafting dialogue prompts and facilitating discussion
- Sample and generic dialogue prompts
- Example assignments and presentation materials

Student Toolkit

- Information on the four ethical themes and writing dialogue prompts

Final Thoughts

TOOLBOX DIALOGUE INITIATIVE™

- The curriculum provides a framework for using the Toolbox Dialogue approach in multiple contexts and subject areas in addressing team science competencies and interdisciplinary collaboration.
- If you are interested in using or adapting the curriculum, please contact us!

http://eese.msu.edu

Having the Difficult Conversations: Using Facilitated Dialogue to Develop Values-Oriented Skills

Chet McLeskey, PhD.

MSU CENTER FOR INTERDISCIPLINARITY

SciTS Conference
May 23, 2019

Quick Outline

- Value-Oriented Skills?
- Conversations… difficult?
- Facilitated dialogues?
- RCR Expansion
- Teams, interdisciplinarity, etc.

Value-Oriented Skills

- Facility with normative concepts and language
- Distancing (willingness and ability to set aside your own normative stance long enough to truly listen to someone else)
- Comfort with ambiguity (ethics is messy)

What makes these conversations difficult?

- Combination of value—oriented skills, argumentative skills, and interpersonal skills
- Lack of practice
- Lack of space*
  - Need place to be naïve

Facilitated Dialogue

- Toolbox Dialogue Initiative… slightly modified
  - Facilitator more involved
    - ‘Socrates in the room’ and *aporía*
- Modules are tailored to the audience
- Participants see that ethics is hard
  - Ambiguity
  - Emotion

The Expansion of RCR and Research Ethics

- "Responsible" is said in many ways
  - Researchers are people, too
  - Efficiency and Quality matter
    - Good use of resources
- Proliferation of obligations
  - Researcher ⟷ researcher
  - Researcher ⟷ public
  - Researcher ⟷ funding agency/administration
  - ⟷

Teams, Interdisciplinarity, etc.

- Science is done in teams and funding agencies require RCR
- Researchers tend to be humans, and humans have values
- Interdisciplinary approach to identifying values and developing workshops
  - Acknowledge the unique aspects of different disciplines while also embracing commonality across all domains of research

Teams, Interdisciplinarity, etc.

- Experts ‘Think different’
  - Experts from different disciplines approach problems differently, affecting the way they think and talk about many things—including values.
  - Logical consequences: issues from moral philosophy
    - Salience
    - Value-frameworks (Utilitarian, Deontological, Aretaic, etc.)

Take home lessons

- People need to actually discuss values
- Talking about these things with people from different disciplines will challenge all interlocutors and will more likely lead to growth.
- Practice, Practice, Practice…
  - These are skills that can be developed, but they can also atrophy
- Vice can be inculcated, too.

Acknowledgements

Center for Interdisciplinarity
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