MICHIGAN STATE UNIVERSITY

TOOLBOX DIALOGUE INITIATIVE™

Training Future Scientists for Complex, Collaborative Research

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Session Two

Goal: Explore the skills and capacities that research leaders need to foster responsible research

Key Questions:

What are the gaps in training and professional preparation?

What leadership approaches foster responsible research?

What risks to the research enterprise do these gaps pose?

Gaps in Research Training

Laboratories and collaborative research

- Laboratories provide collaborative training in experimental design and execution, fieldwork, co-presentation, and co-authorship,
- But they are often focused on training students and early career scientists to conduct ***disciplinary*** research in the fashion of the lab
- But this training does not often emphasize ***crossdisciplinary*** research

Gaps in Research Training

Collaborating across disciplines

- But the research landscape has changed and will continue to change, with more and more science requiring collaboration across disciplines
    - Complex research that integrates different disciplinary perspectives is a part of the portfolio of many funding agencies
    - Large-scale, complex, and crossdisciplinary problematics – “Grand Challenges”, “SDGs” – have risen in prominence
    - Concern about their future motivates interest in such problems among early career scientists

Gaps in Research Training

Focusing on a gap in *training*

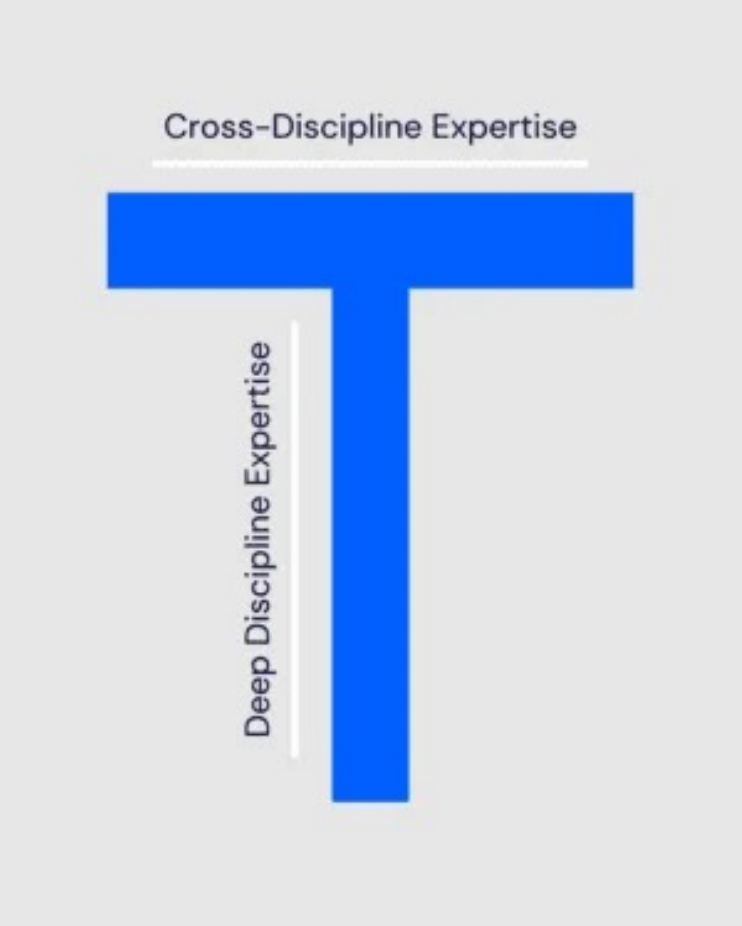
- The gap I want to highlight is a gap in ***training*** provided by research leaders to students and early career scientists
- Students and early career scientists are not often provided training opportunities in ***crossdisciplinary team science***
- We do them a disservice by not training them to function in this complex research landscape

Gaps in Research Training

Acknowledging that relevant training exists

- Of course, there are training programs that focus on crossdisciplinary training: NSF NRT, institutionalized programs in environmental science, PPE, etc.
- But there are fewer – far fewer, I would suggest – that provide training in *collaborative* crossdisciplinary science

Gaps in Research Training



Crossdisciplinarity the old-fashioned way

- Traditionally, researchers are expected to build disciplinary depth before interdisciplinary breadth, and working across disciplines is not part of the training
- As a result, researchers join crossdisciplinary teams unprepared to communicate with collaborators from other disciplines
- They often do not know how to build the common ground required for substantial integration of disciplinary perspectives

Gaps in Research Training

Challenges for new crossdisciplinarians

- Two that we concentrate on in the Toolbox Dialogue Initiative
  - The Problem of Unacknowledged Differences
  - The Captain Obvious Problem

Gaps in Research Training

Summarizing the gap

- The gap: traditional training of disciplinary experts does not include training for cross-disciplinary collaboration, but this is and will continue to be a research growth area
- Minding the gap: Success in disciplinary research doesn't entail success in interdis-ciplinary research; the gap also exists for more senior colleagues
- Recommendation: Provide training oppor-tunities in crossdisciplinary team science

Leadership Approaches

Close the gap by prioritizing training

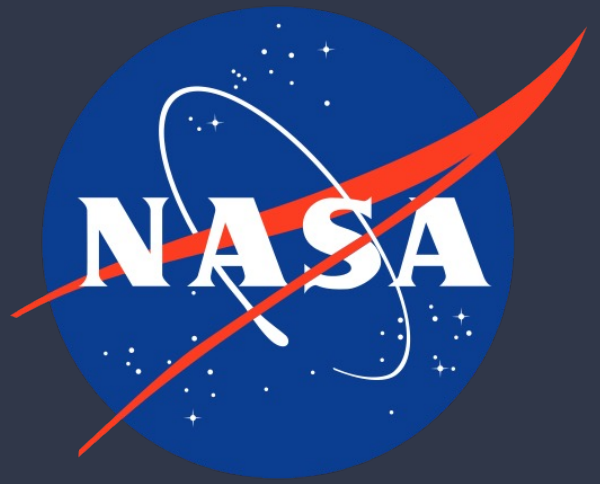
- This gap can be addressed if we identify it, prioritize it, and act on it
- Research suggests that interventions can help build collaborative capacity and improve research outcomes
    - Team development interventions can be helpful in improving efficiency and effectiveness, although one size doesn't fit all[1]
    - "[S]imple formal interventions can improve knowledge integration when they lead … group members to … improve their work process"[2]

(1) Shuffler, M. L., et al. (2011). *Curr. Dir. in Psych. Sci.* 20(6): 365–372. (2) Okhuysen, G. A., & Eisenhardt, K. M. (2002). *Org. Sci.*, 13, 370–386.

Leadership Approaches

This is happening: Funders

- Funders are beginning to recognize that you can increase return on investment by building capacity within funded teams through explicit training
    - Examples of funder-driven capacity building efforts include the NSF Growing Convergence Research Program, the NSF AccelNet Program, and the NASA Heliophysics DRIVE Science Center Program



NSF's Convergence Accelerator

Leadership Approaches

This is happening: Funders

- ***A prominent example***: The NSF Convergence Accelerator requires awardees to participate in an 18-week long curriculum that includes sessions on communication, human-centered design, and team science
    - The Team Science Faculty provides training in crossdisciplinary communication, conflict management, building trust and psychological safety, and developing a mutual learning mindset
    - Our goal is to build collaborative capacity within research teams so they can function effectively in complex and accelerated research environments

Leadership Approaches

This is happening: Consultants

- Others taking the lead include integration specialists and small organizations and initiatives
  - One example: the Toolbox Dialogue Initiative (TDI)

TDI: Who We Are

TDI is a consulting and research group based at Michigan State University

We facilitate collaborative capacity with partners around the world and investigate the practice of collaborative, crossdisciplinary research

TDI: What We Do

TDI enhances communication and collaboration through dialogue-based workshops and related activities to address the Problem of Unacknowledged Differences[1]

(1) Hubbs, G., et al. (Eds.). (2020). The Toolbox Dialogue Initiative: The Power of Cross-Disciplinary Practice. Boca Raton, FL: CRC Press.

TDI: How We Help

TDI helps cultivate a dialogical communication culture that enables complex teams to leverage their differences and produce integrated responses to complex problems[1]

(1) O'Rourke, M., et al. (2023). In Gosselin, D. C. (Ed.), A practical guide for developing cross-disciplinary collaboration skills (pp. 83-102). Cham: Springer.

Risks

Failing to meet our responsibilities as research leaders

- By not providing training that builds collaborative, crossdisciplinary capacity, we run two risks:
  - To our students: We risk not meeting our responsibilities as mentors and educators by depriving the next generation of the skills they need to succeed in crossdisciplinary research environments
  - To the broader public: We risk not having the experts we need to address urgent, even existential problems

Risks

Expand the scope of responsible research

- Providing training in crossdisciplinary team science should be understood as an aspect of ***responsible research*** and included in RCR training
    - RCR focuses on preventing transgressions, but there are also approaches that emphasize creating conditions conducive for growth and excellence[1]
    - ***Responsibility*** is normative, and the relevant norms for research practice are both ethical and epistemic; as it is, RCR focuses on ethics but should also address epistemology
    - By training people to be responsible collaborators on complex research teams, you can train them to avoid epistemic injustices, e.g., disciplinary chauvinism, epistemic exclusion[2], and exhibit virtue in their research collaborations

(1) Pennock, R. T., O'Rourke, M. (2017). Developing a scientific virtue-based approach to science ethics training. *Science and Engineering Ethics* 23(1): 243–262.
(2) Settles, I. H., et al. (2020). Epistemic exclusion. *Jour. of Div. in High. Ed.,* 14(4), 493-507; https://we2project.weebly.com/

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Thank you!

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