

Preparing Future Leaders: Rural Resource Resiliency (R3)

KSU's NSF Research Traineeship (NRT), 2018-2023, NSF grant number: 1828571

Evaluation findings show that the KSU NRT was an inclusive, supportive, applied curriculum that enabled 39 graduate students to train as interdisciplinary scientists and produce innovative, interdisciplinary research.

The KSU NRT program trained graduate students to study issues pertaining to food, energy, and water systems (FEW) in western Kansas from diverse scientific, engineering, and social science perspectives. A WEC evaluator worked collaboratively with KSU NRT leadership to plan evaluation activities, and then shared findings as formative feedback, which was used to shape and improve the program.

Attracted, Supported, and Motivated Students

Survey ratings and written feedback, along with observations made by NRT faculty in their classrooms, show how the NRT offered an inclusive, supportive program.

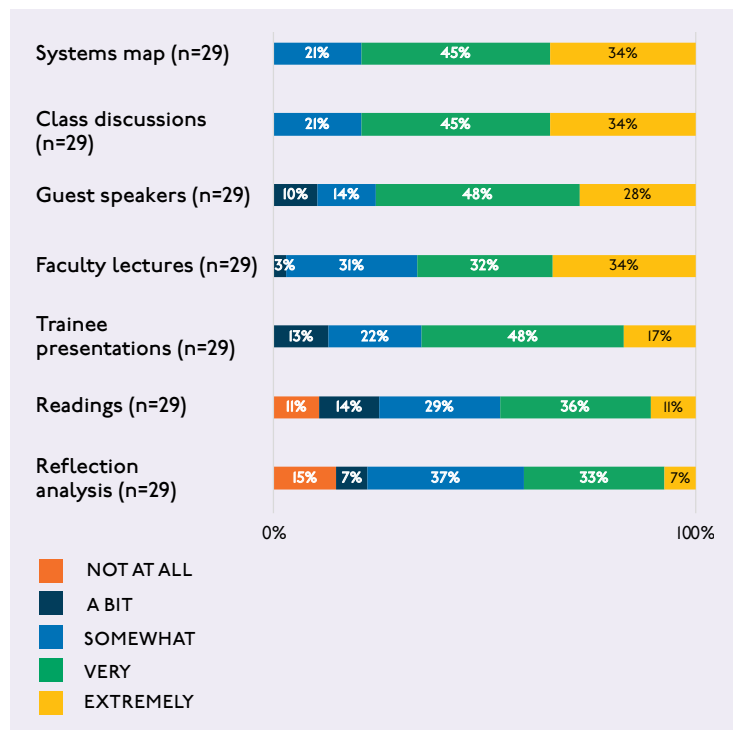
- Inclusive**
 - One-quarter of trainees identified themselves as Black, Latino/a/x, and/ or Native American.
 - More than half of trainees were women.
 - Students thought NRT was a very inclusive program.
- Supportive**
 - Communicated during pandemic: Monitored students and opened dialogue for processing their experiences.
 - Promoted confidence: Each cohort reported gains in confidence for working on interdisciplinary science teams.



- Mentoring**
 - Career conversations occurred earlier on in students' graduate programs.
 - Faculty mentoring and guest speakers were very useful for career planning.

- Courses**
 - Activities in courses were useful to students for developing integrated systems thinking skills (see Figure I).

FIGURE I: Usefulness of Integrated Systems Course Activities



Training Students for Success

Survey feedback and scores on delivering persuasive speeches show how the NRT prepared students to thrive as interdisciplinary scientists.

Field Experiences **Field trips** made students more aware of FEW systems challenges, the importance of their own work, and how conditions in FEW systems affect stakeholders.

“Being able to tour the sites and ask questions directly to stakeholders allowed for a hands-on learning type, which I enjoy and learn from the most.”

Skills development through coursework Through the **Integrated Systems Thinking course**, students from each cohort gained skills on how to:

- Collaboratively diagnose FEW systems challenges
- Be aware of FEW stakeholders’ diverse perspectives
- Conceptualize key FEW system elements and processes
- Interpret systems from multiple perspectives
- Communicate across disciplinary boundaries
- Communicate scientific knowledge to diverse audiences
- Collaborate on interdisciplinary teams

Through the **Seminar course**, students gained persuasive speaking skills and reflection skills

For a **Capstone course** project, students:

- Wrote a literature review
- Produced a research paper
- Worked in interdisciplinary teams

TABLE I

A Total of 39 Students Trained

KSU NRT COHORT	# STUDENTS
2019-2020	16 (11 PhD, 5 MS)
2020-2021	7 (4 PhD, 3 MS)
2021-2022	8 (5 PhD, 3 MS)
2022-2023	8 (1 PhD, 7 MS)
TOTAL	39

Outcomes and Ripple Effects

Student surveys, faculty interviews, and a review of products and benefits shine a light on the legacy of the KSU NRT.

Milestone and Products

- Number of students trained to study interdisciplinary FEW systems: 39
- Sectors where graduates are finding jobs: industry, military, and academia
- Research journals where you will find their papers:
 - Agricultural Water Management
 - Frontiers in Sustainable Food Systems
 - Environmental Science: Water Research & Technology
 - Bioresource Technology
 - Science of The Total Environment
- A reliable rubric for assessing persuasive speeches. Email us for more information: ksunrt@k-state.edu

Benefits for faculty Supported **accomplishments**:

- Asset for gaining tenure
- Catalyzed new research collaborations
- Added breadth and depth to research
- Infused fresh ideas about limitations and impact of studies

Expanded **networking** and exposure to new disciplines

Supported **growth in interdisciplinary research**:

- Honed interdisciplinary communication skills
- Received exposure to new ways of mentoring students
- Wrote proposals with new teams
- Taught about and studied FEW systems

“The interdisciplinary discussions among researchers involved with the NRT have helped me engage with other departments and then engage with the industries that come to campus.”

About the Wisconsin Evaluation Collaborative

The Wisconsin Evaluation Collaborative (WEC) is housed at the Wisconsin Center for Education Research at the University of Wisconsin-Madison. WEC’s team of evaluators supports organizations and initiatives through culturally responsive and rigorous program evaluation. Learn more at wec.wceruw.org.