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Fostering agents of change: Can a local water crisis shift student's values, goals, and priorities?

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Elon University

Bringing ENS students “down to Earth”

Intro level students often have a “global” perspective on environmental problems

Goal: foster sense of agency and social responsibility in ENS students

- Guided self-reflection in a **place-based curriculum** may promote change in students’ frame of reference; may lead to transformative learning (Fisher et al 2019, Steven et al 2017)
- **Community engagement** enhances personal and social responsibility (Jacoby 2015)

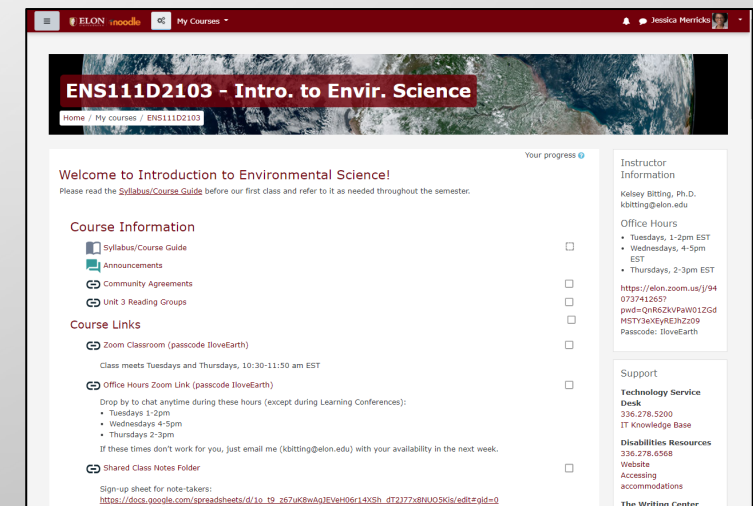
Study Context

Elon University

- Medium, 4-year private PUI

Introduction to Environmental Science, Spring 2021

- Virtual, synchronous format (Zoom, Moodle)
- 19 participants
- Diverse majors & classes
 - Mostly non-science majors

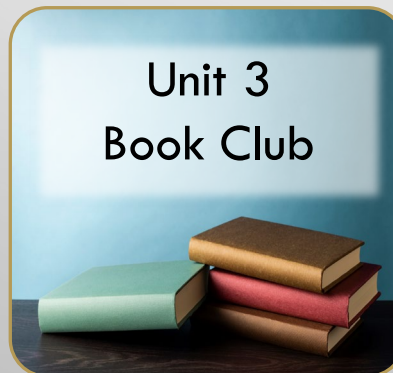




Goal Setting & Benchmark tasks
6 Guided Inquiry Lessons
Capstone (fictional)
Learning Reflection



Goal Setting & Benchmark tasks
6 Guided Inquiry Lessons
Capstone (real)
Learning Reflection



Goal Setting
Book Club
Group Book Review
Learning Reflection



ePortfolio
End of Semester Survey

Course Objectives

1. Connect with personal goals, values, & skills
2. Engage in sci process
3. Describe/illustrate the cycling of matter/energy
4. Discuss env. issues with various stakeholders
5. Design approaches to mitigate env. impacts

Place-based Learning

"...Situated, context-rich, transdisciplinary teaching and learning modality distinguished by its unequivocal relationship to place..." (Semken et al., 2017)

Learning outcomes:

- Student place attachment and/or meaning (Young, 1999; Semken et al., 2009; Lee & Chiang, 2016; Jolley et al., 2018; Kudryavetsev et al., 2012; Kuwahara, 2013)
- Pro-environmental values and behaviors, sense of belonging in and ownership of local areas (Russ et al., 2015)
- "Appreciation for, awareness of, and motivation to learn about the earth sciences" (Charlton, 2017)



Community Engaged Learning

Facilitates traditional learning outcomes as well as:

- professional learning skills
- civic & social values
- personal development



NCSU Water Quality and Treatment Research Group

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Research Questions

Does this unit help students recognize themselves as agents of change in their local community?

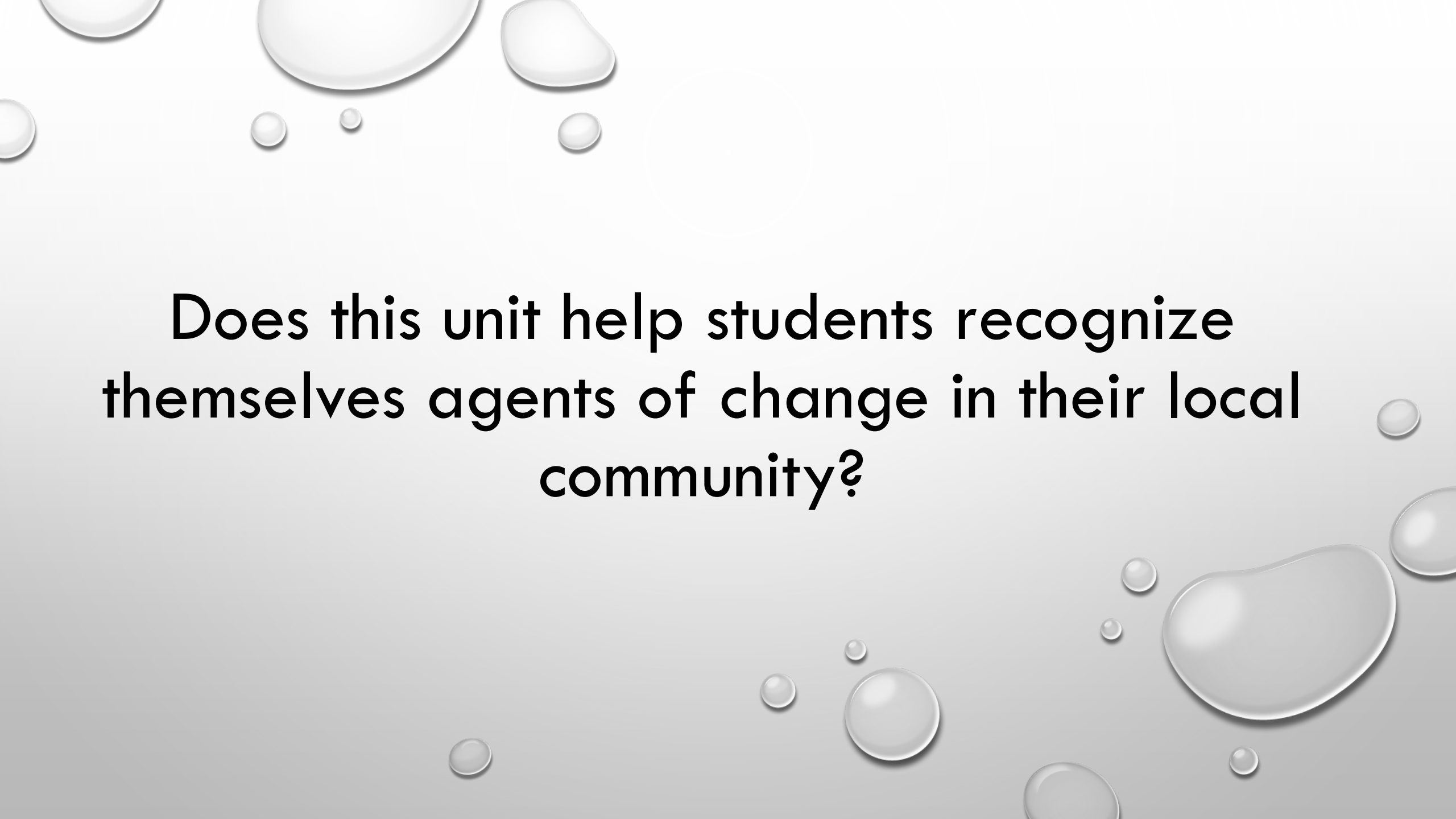
Does participation in the unit shift their values, goals, and priorities?

Do students understand the real-world implications of the course overall?

Methods and Analysis

Open-coded students' Learning Reflection & Goal Setting activities for the following themes

| Codebook | |
|--|--|
| Agency Codes | |
| Environmental/ Social Issues | States a planned/intended action related to addressing an environmental or environmental justice issue |
| Learning/Study Behavior | States a planned/intended action related to addressing students' own learning and/or study behavior |
| Ownership Codes | |
| Environmental/ Social Issues | Explicitly states a perception of value with relation to an environmental or environmental justice issue |
| Learning/Study Behavior | Explicitly states a perception of value with relation to students' learning and/or study behavior |
| Δ Goal, Value, and Priority Codes | |
| Δ Goal | An explicit description of a change in a students' planned objectives |
| Δ Value | An explicit description of a change in a students' beliefs about factors that determine personal happiness or success |
| Δ Priority | An explicit description of a change in a students' most important areas of focus |

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**Does this unit help students recognize
themselves agents of change in their local
community?**

Medium/large effect on students' demonstrations of agency and ownership over environmental/social issues

| | Ownership | Agency |
|------------------|-----------|--------|
| Unit 1 | 0.11 | 0.04 |
| Unit 2 | 0.16 | 0.08 |
| <i>p-value</i> | 0.07 | 0.30 |
| <i>Cohen's D</i> | 0.69 | 0.54 |

"I am now double majoring in Public Health and Environmental Studies, so even though I'm still passionate about health, I've decided that I can be passionate about two things. Even though the workload might be hard, **I want to continue learning about the environment and how we can change for the better.**"

**Excerpt shows shift in
Environmental Goals**

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**Does participation in the unit shift their
values, goals, and priorities?**

Students were *NOT* more likely to shift their environmental goals and priorities during the place-based unit

| | Values | Goals |
|--------|--------|-------|
| Unit 1 | 7 | 2 |
| Unit 2 | 5 | 2 |

...my **value for the earth has grown a lot more than it was in Unit 1**. I have come to have a real appreciation for the planet we live on and a better understanding of how human actions really impact the quality of the planet. I would like to get a professional career that isn't involved in any harmful practices that hurt the environment. **After this past unit I have come to value equality as well, after we learned about the inequality of water shutoffs.**

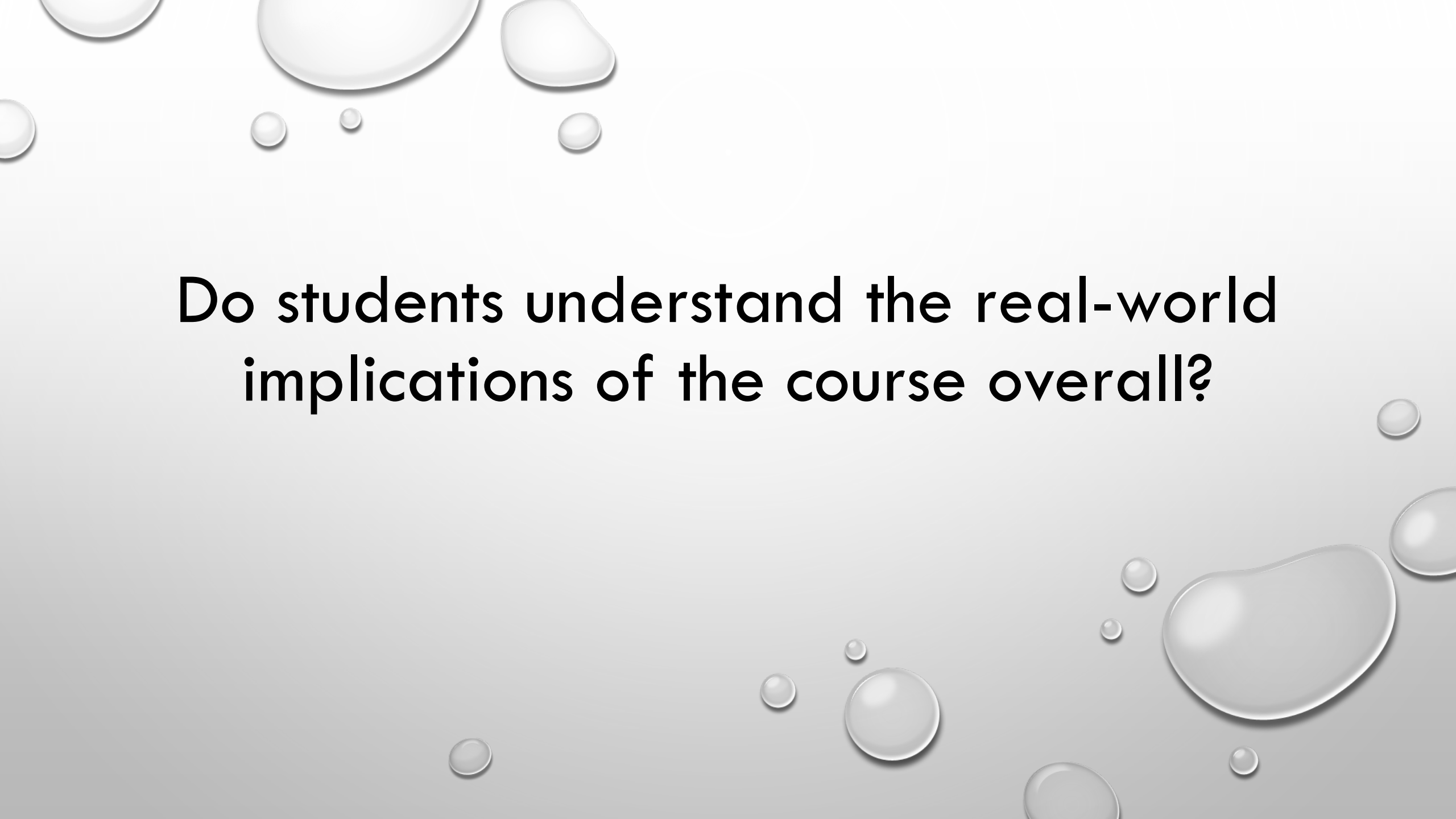
Excerpt from end of Unit 2
Goal Setting Activity

BONUS: Students *DID* demonstrate a shift in agency over their personal learning/study behavior

For example, when identifying graphs, tables, charts, and reading articles with unfamiliar words, I would search what the chemicals are and do some more research on what they do. The readings did not particularly describe the chemicals and exposures so searching them really allowed me to further understand what it was and how it effected short and long term health issues. **Doing these things really helped me understand more about class content. As a result, I have gained even more knowledge of PFAS, drinking water, and affected areas in North Carolina**

**Excerpt shows shift in
Personal Learning/Study Behavior**

| | Ownership | Agency |
|--------|-----------|--------|
| Unit 1 | 94 | 77 |
| Unit 2 | 92 | 83 |

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**Do students understand the real-world
implications of the course overall?**

STUDENT VOICES:

End of semester Surveys

The PFAS unit for me, and seemingly others was very eye opening. Most people who I have asked didn't have any idea as to what it was, and to see such a prevalent issue go unnoticed is both frustrating and worrisome. **I was able to gain a deeper dive into the issue in a unit than most people have in their lifetime** and I realized it is important for people like myself who now understand the issue to talk about it and inform others.

Q: Which activities were most meaningful to you, or most helped you learn? Why?

I really enjoyed the Clean Haw River activity because **it made me feel like I was making real change and difference** that I could see working in an area located near me.

I think the activities we did involving Pittsboro was very meaningful to me because **it felt like a real world case that we could really help with.**

Closing Remarks

- Place-based units provide opportunities to engage in a real environmental issue “close to home”; community engagement provides a real context for students to direct their work
- Our place-based unit fostered students’ agency and ownership over environmental/social issues
- Future direction: the role of alternative assessment approaches (e.g. “ungrading”) on students’ approach to learning

Thank You!

Want more details about our curriculum and community engagement?

Don't miss Kelsey's poster presentation on Friday!

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