How Can We Build Teacher Capacity for Designing Transdisciplinary Learning Experiences?

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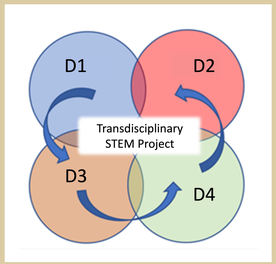
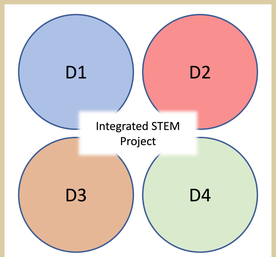
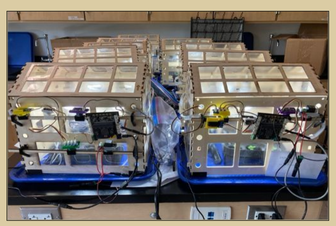
What does Transdisciplinary Learning look like?

- Learning crosses disciplinary boundaries
- Problem-context is critical
  - Problem-driven acquisition of new knowledge;
  - Traversing back and forth across disciplines;
  - Selecting and interweaving of disciplinary practices to solve the problem



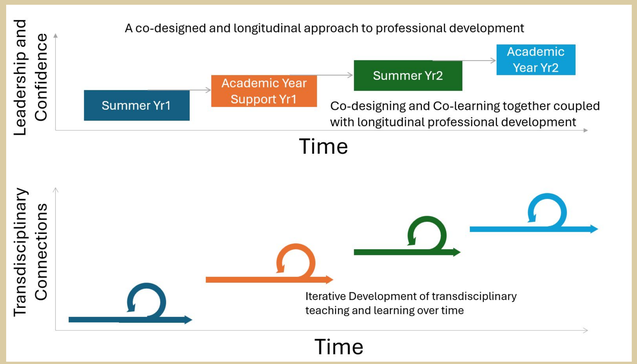


- Multiple disciplinary content and skill pathways for students to explore based on their interests
- Physical computing can be an ideal context for transdisciplinary learning



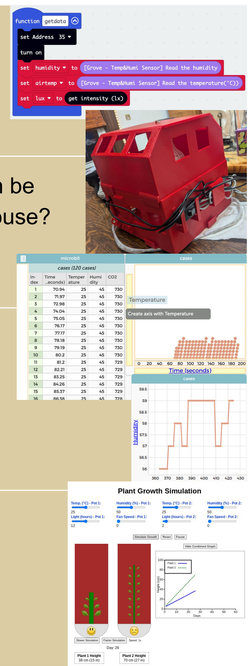
Professional Development Program Design

Two-year co-design model



Smart greenhouse project (core disciplines: engineering, computer science, data science, physics, plant science, artificial Intelligence)

Modules	Example Driving Questions
Computation Focused	How to code sensors to collect data? How to code relays to control actuators and real-world objects? How to use coding to monitor plant health?
Engineering Focused	What characteristics of the greenhouse can be changed to improved airflow in the greenhouse? How to keep the humidity and temperature of the greenhouse within certain ranges?
Data Science Focused	Best ways to represent data to convince family members to set up a greenhouse at home? How to use the data to recommend changes to the greenhouse design?
Plant Science Focused	What conditions are ideal for my plants? How to collect and use data to maintain conditions that are ideal for my plants? What changes to the greenhouse are needed to keep my plants healthy?

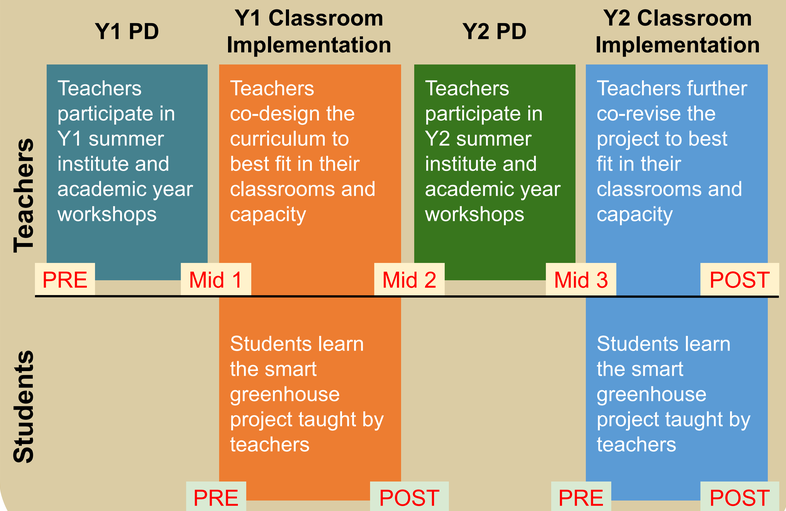


Research Design

RQ1. How do teachers' perceptions and confidence levels of creating transdisciplinary learning experiences in the classroom change as they participate in the PD program?

RQ2. What practices do teachers adopt to enact transdisciplinary teaching in classrooms when teaching with the smart greenhouse project?

RQ3. How and to what extent do teacher-created transdisciplinary learning experiences impact students' beliefs regarding their STEM interest, identity, confidence, and cross-disciplinary connections?



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