Collaborative Research: Designing Computational Modeling Curricula across Science Subjects to Study How Repeated Engagement Impacts Student Learning throughout High School (RPP)

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Problems of practice

- Inequitable access to CT and CS for ALL high school students
- Teachers lack relevant PD and curricular resources to incorporate 3D NGSS learning

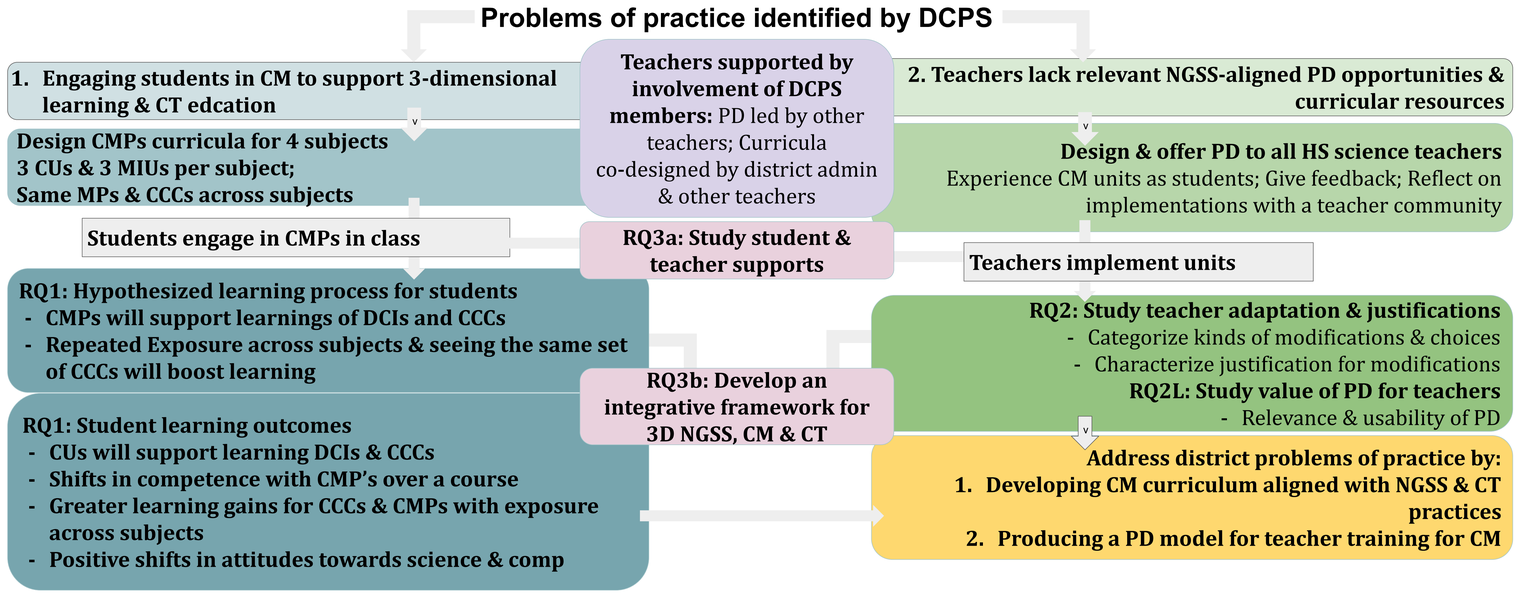
Problem space: Gaps in the lit

- Evidence that computational agent-based modeling supports science learning and CT (e.g., Weintrop et al., 2015; Sengupta et al., 2013; Wagh & Wilensky, 2017)
- Lack of research on impact of sustained exposure to CM across multiple subjects

Project objectives

- Develop NGSS-aligned modules with computational ABM using StarLogo Nova
- Provide PD to support teachers to use these units
- Study how longitudinal exposure to computational modeling impacts student learning; and,
- Build capacity by establishing a design collaborative between STEM Integration leaders in DCPS, teachers and researchers.

Logic model



Generative tensions

- Supporting teachers in shifting established pedagogical practices towards more NGSS-aligned instruction
  - Teachers pushed for a worksheet to allow student autonomy…they were worried about "sage on the stage" but did we create a "sage on the page?"
- Meaningfully integrating science and computing into 5-day lesson sequences
- Differentiated instruction v/s generative scientific discourse for modeling instruction

Research considerations

- How can we track longitudinal evidence of students' learning of computational modeling practices across multiple STEM disciplines?
  - Pre-post unit: How do we design assessment items that allow us to trace shifts in 3D learning across disciplines?
  - Video data of student interaction: What are signals of shifts in students' computational modeling work over time?
  - Student models: How might students' models across courses change in ways that reflect 3D learning?

SCHELLER TEACHER EDUCATION PROGRAM education arcade

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This material is based upon work supported by the National Science Foundation under Grant No. 2200917. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.