

TEACHERS' LEARNING TRAJECTORIES: TRACKING BEGINNING SCIENCE TEACHERS' DEVELOPMENT OF PEDAGOGICAL REASONING & IMPACT ON STUDENT LEARNING

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The purpose of the study is to:

- 1) understand the academic, social and intellectual influences on beginning science teachers' learning
- 2) investigate what their pupils learn about science

| Undergraduate training | UW TEP coursework | Student teaching | First year of teaching |
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| Influence of background experiences and beliefs about the nature of inquiry | Influence of course experiences and collegial interactions | Influence of cooperating teachers', the school context, and examining student learning | Influence of school context, peers, and examining student learning |

Research Questions:

- 1) How do novice educators learn a complex skill like teaching across multiple contexts?
 - What is the impact of undergraduate and teacher education coursework in developing pedagogical reasoning?
 - What is the impact of cooperating teachers and school contexts on pedagogical reasoning and practice?
 - How does additional support in the form of collegial examination of student work contribute to the development of effective teaching practices?
- 2) How do experiences gained across the various contexts of teacher development influence *student learning* of science content and discipline-based inquiry?

Overlap with TNE Design Principles:

- 1) Design Principle A: Decisions Driven by Evidence
 - Drawing upon research
 - The role of pupil learning
- 2) Design Principle B: Engagement with the Arts & Sciences
 - Subject matter understanding
- 3) Design Principle C: Teaching as an Academically Taught Clinical Practice Profession
 - Pedagogy
 - Schools as clinics

- Residency (induction)
- Preparation of candidates for professional growth
- The role of pupil learning

Lessons Learned:

- 1) Undergraduate experiences with scientific inquiry actively shape students' conceptions of science and the epistemological frameworks they use to reason scientifically.
- 2) It is possible for TEP students to advance their epistemological sophistication through methods instruction and discourse with peers.
- 3) This change in discourse translates to the classroom where student-teachers teach more than just science content; many (explicitly and implicitly) press their pupils to engage in sophisticated forms of scientific reasoning.
- 4) This type of ambitious teaching is more pedagogically demanding and often requires support in the form of evidence-based debriefing.
- 5) Other non-trivial teaching practices emphasized in methods coursework were integrated into teaching without support, such as the practice of adapting instruction based on pupils' current understandings.
- 6) Support from cooperating teachers ranged but many cooperating teachers believed it was important to elicit pupils ideas and encouraged student-teachers to use practices that made pupil thinking explicit. However, many of the ST-CT conversations revolved around logistics of material activity and efficiencies related to these and other classroom practices. In most cases there was little support from cooperating teachers to follow-up on what pupils said as a method for understanding students' conceptions and alternative conceptions.

Next Steps:

- Analysis of student learning with student teachers, cooperating teachers and research team
- Work with other TNE projects to find ways to sustain research component in upcoming years