

## Navigating Socio-Emotional Risk through Comfort-Building in Physics Teacher Professional Development: A Case Study

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**OVERVIEW:** In teacher professional development, socio-emotional risks can arise during collaborative science content reasoning tasks. This exploratory case study elaborates the comfort-building moves used by teachers to productively navigate tense moments.

**AUDIENCE:** Assessment developers, Instructional designers, K-12 science teachers, Professional development providers, Researchers/Researcher supervisors, Science education leaders, Secondary science teachers, Teacher educators, Biology educators, Chemistry educators, Physics educators, STEM educators, Engineering educators

### KEY POINTS

- Heterogeneous science teacher groupings in PD activities can stimulate novice teacher development.
- Less experienced teachers can face socio-emotional risks in these groupings that can stymie learning.
- *Comfort-building* moves can support the development of a safe space for teachers to face these risks.
- Distancing from disciplinary ideas, or showing empathy when risks arise, can be *comfort-building*.
- Highlights an affective dimension to be considered in the study and facilitation of science teacher PD.

**INTRODUCTION:** Recent work on learning emphasizes a holistic theory of contextualized, affect-driven conceptual learning. This exploratory case study examines how socio-emotional risks posed by a Content Knowledge for Teaching Energy (CKT-E) task during professional development (PD) were navigated by a pre-service and a veteran teacher through *comfort-building* moves. Video data of their interaction and post-interviews were analyzed to answer: (RQ1) How can socio-emotional risks related to science content surface in secondary science teacher PD? (RQ2) What conversational, comfort-building moves can teachers use to mitigate these risks and support a safe space for discussing scientific content and reasoning?

**FINDINGS:** Regarding RQ1, we attribute the pre-service teacher's initial sense of risk and discomfort to (a) encountering a problem she initially did not know how to solve, (b) the expectation that physics teachers should quickly and accurately answer such questions, and (c) her pairing with a more experienced teacher.

Regarding RQ2, our analysis reveals four moves that can mitigate socio-emotional risks to allow teachers to discuss physics content: (a) Challenging the Epistemic Activity of Finding the One Correct Answer, (b) Revealing Vulnerability, (c) Collaboration-Centered Problem-Solving, and (d) Storytelling. More broadly, comfort-building moves fell into two classes: (1) moves that diverted conversation from tense or stressful topics, and (2) moves that conveyed and built empathy, care, and trust. Together, these moves worked to build the pair's tolerance of risk. Not only do the teachers

build consensus around the correct answers and explanations, but in discussing incorrect multiple-choice options, they practice and develop their content knowledge for teaching.

**TAKEAWAYS:** This work builds on and connects to existing theoretical models of how collaborative groups identify, respond to, and mitigate risk when approaching challenging science questions, adding a case to a growing body of empirical support for these models. First, focusing on the affective dimension of the teachers' learning, the case informs our understanding of knowledge co-construction when socio-emotional risks are involved. Second, this study offers theoretical insights into how teachers mitigate risk through comfort-building moves, which could lead to practical applications in teacher PD.

The findings of this case study relate to a persistent problem of practice within in-service secondary science teacher PD: the challenge of interweaving content learning for teachers who are nominally already content experts. Future research can explore how PD facilitatory choices could help design for comfort-building. First, problem tasks might be explicitly framed as discussions of pros and cons of different responses, a comfort-building framing the teachers in our case adopted themselves. Second, future research can explore the consequences of homogeneous and heterogeneous grouping of teachers according to experience or other aspects of their enacted identities. Additionally, PD facilitator moves can be investigated in terms of how they facilitate teacher comfort and teacher-teacher comfort-building.