

Exploring How Teacher Curricular Sensemaking And (Un)Certainty Impacts Students' Scientific Sensemaking

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OVERVIEW: We explored a middle school science teacher's curricular sensemaking as they planned and enacted a storyline curriculum and the resulting impacts on students' opportunities for scientific sensemaking.

AUDIENCE: Instructional designers, K-12 science teachers, Professional development providers, Researchers/Researcher supervisors, Science education leaders, Teacher educators

KEY POINTS

- Curricular sensemaking involves perceiving and resolving (un)certainities that emerge in a teacher's interaction with and use of a curriculum, with moments of perceived *certainty* being just as consequential as moments of *uncertainty* for understanding how teachers make sense of their curriculum use.
- Teachers' curricular sensemaking can open up or close off opportunities for students' scientific sensemaking, as they respond to perceived (un)certainities and tensions that emerge.
- Teachers new to reform-oriented science instruction need help recognizing the nuanced differences between their current science instruction and the science practices promoted in such reforms.
- Teachers new to reform-oriented science instruction need support to build their capacity to differentiate between various causes of student discomfort and uncertainty so that students' needs and scientific sensemaking goals can be attended to simultaneously.
- Teachers new to reform-oriented science instruction need opportunities to consider how they might use a variety of participation structures to move learning forward while preserving students' rights and responsibilities for scientific sensemaking.

INTRODUCTION: Research has shown that teachers learn from and use educative, reform-oriented curriculum in various ways based on their experiences and understandings related to science teaching. Thus, revealing how teachers make sense of their interactions with the curriculum to inform the planned and enacted curriculum is an essential part of curriculum research. We refer to this process as a teacher's *curricular sensemaking*, which involves perceiving and resolving uncertainties that emerge in a teacher's interaction with and use of the curriculum. This study explored a middle school science teacher's curricular sensemaking in interaction with their use of an educative storyline curriculum that was intentionally designed to center students' scientific sensemaking. Using a phenomenological case study methodology, we examined how one middle school science teacher perceived and resolved (un)certainities that emerged in their interaction with the curriculum (i.e., their curricular sensemaking), and how the teachers' curricular sensemaking impacted opportunities for students' scientific sensemaking.

FINDINGS: Findings served to expand our notions of how teachers engage in curricular sensemaking. In particular, when considering the substance of the focal teacher's curricular sensemaking, we found that moments of perceived *certainty* were just as consequential as moments of *uncertainty* for understanding how the teacher experienced his curriculum use. Additionally, when making sense of a new curriculum, the teacher not only perceived his own (un)certainities, but also sought to recognize or

anticipate (un)certainities on behalf of his students. Importantly, these (un)certainities emerged at different points throughout his interaction with the written, planned, and enacted curriculum, and also evolved across these time points in consequential ways. Moreover, we uncovered two major types of (un)certainty that contributed to the ways in which the focal teacher experienced his curriculum use. These were: 1) (un)certainty around students' scientific sensemaking through particular science practices and 2) (un)certainty about how to navigate the storyline curriculum using students' ideas to drive learning forward. The ways in which the teacher responded to these (un)certainities tended to shift sensemaking responsibility away from individual students and toward whole-group, shared sensemaking.

TAKEAWAYS: Findings suggest the need to 1) support teachers in problematizing their own understandings about particular science practices and the extent to which their previous instruction aligns with reform-oriented conceptualizations of those practices, 2) build teachers' capacity to differentiate between various causes of student discomfort and uncertainty so that students' needs and scientific sensemaking goals can be attended to simultaneously, and 3) provide teachers with opportunities to consider how they might use a variety of participation structures to move learning forward while preserving students' rights and responsibilities for the scientific sensemaking.

Full Title: Teacher Curricular Sensemaking: Revealing Salient Moments of a Science Teacher's (Un)certainty in Relation to Opportunities for Students' Scientific Sensemaking