So What? Now What? Two Tools for Supporting Teachers' Thought Experiments

Sarah Larison, Jen Munson, and Jennifer Richards
slarison@u.northwestern.edu, jmunson@northwestern.edu, jrichards@northwestern.edu
Northwestern University

Abstract: Prior work has found that engaging in thought experiments is one way teachers draw implications for their teaching as they make sense of their own and their peers' noticings about a shared experience. Here, we examine thought experiments in the context of an online teacher learning course and two tools within it: a tagging tool and a commenting tool. We explore whether teachers organically engaged in thought experiments and how the tools supported that work.

Keywords: Teaching, Professional Development, Mathematics Education

Teacher noticing has been conceptualized as attending to and interpreting particular sensory data in a classroom setting (Sherin, Jacobs, & Philipp, 2011), and has been theorized as an important leverage point for developing a responsive teaching practice (e.g. Colestock & Sherin, 2015). Little work, however, has examined the ways teachers draw implications for their teaching practice as they engage in opportunities designed to strengthen their noticing skills. Thought experiments are one way teachers engage in the cognitive work situated between teacher noticing and teacher practice (Baldinger & Munson, under review). Previous work on thought experiments in debrief discussions found that they share four key features: they pose an alternative set of circumstances to what occurred in a shared experience or artifact; they describe an imagined, though not imaginary, context other than the shared experience or artifact; they pose a question and/or hypothesis about what would occur under those imagined circumstances; and they may or may not come to conclusions (Munson, Baldinger, & Larison, under review). Thought experiments appear to be a useful mechanism for and evidence of teacher sensemaking and learning, as they allow teachers to draw from their noticings to explore and conjecture about what could have or might happen under different conditions, such as those in their own classroom. Prior work found that teachers, when making sense together synchronously after a shared experience, often initiated thought experiments organically (Baldinger & Munson, under review). We wondered whether teachers, making sense of shared artifacts *asynchronously*, would also initiate thought experiments organically.

In this study, we explore teachers' thought experiments in the context of primary mathematics teachers' discourse around video from each other's classrooms during a six-week online course. One goal of the course was to support teachers in strengthening their skills at noticing student mathematical thinking when watching and reflecting on their own and their peers' videos of instruction. Here, we ask: When teachers were prompted to notice, did they organically engage in thought experiments about teaching and learning outside the bounds of the video artifact? Which tools in the online course platform appeared to support teachers in engaging in thought experiments?

Ten K-2 teachers from a suburban Midwestern school district participated in the course, which was designed to support noticing of students' mathematical thinking. Each week, teachers were asked to try on a practice or routine designed to engage students in mathematical argumentation, video-record their lesson, and trim and upload a clip of their video to the platform to share with peers. Then, teachers were prompted to notice and discuss interesting moments of students' mathematical thinking in their own and each other's videos. Teachers used two tools on the platform to support their noticing work: a tagging tool and a commenting tool. The tagging tool was embedded within teachers' videos and allowed video viewers to mark and respond to noteworthy moments in the moment of viewing. The commenting tool was akin to a discussion board and provided space for video viewers to reflect on peers' written reflections and videos.

We analyzed contributions teachers made using the two different tools — tags teachers made directly on their own and peers' videos (n=237) and comments teachers made about peers' videos on the discussion board (n=104). All ten teachers used both tools; in this study, we analyzed the extent to which teachers used these tools to engage in thought experiments. As discussed above, we define thought experiments as one type of cognitive work in which teachers draw on their noticings to explore and conjecture about what could have or might happen under different conditions, such as those in their own classroom. For instance, a teacher remarked, "I was really impressed with how he saw a hexagon in this shape. It's so interesting how one student sees a cupcake and the other a hexagon. *I wonder about how that translates to the way they see other things in the real world.*" In this

italicized thought experiment, the teacher opened space to imagine beyond the context in the video and questioned how the students' thinking might translate to contexts "in the real world." Phrases like "I wonder," and "I should have" often accompanied teachers' thought experiments.

Overall, nine of the ten teachers engaged in thought experiments using both the tagging and commenting tool. We found that proportionally, teachers engaged in thought experiments more in the commenting tool than in the tagging tool. 32% of the comments involved thought experiments (33 out of 104), and 15% of the tags involved thought experiments (35 out of 237). While both tools created opportunities for teachers to draw implications from their noticings to classroom practice, teachers were more likely to do so with the commenting tool.

Furthermore, of the 33 thought experiments in comments, 82% (27 out of 33) occurred when the teacher had also tagged the related video. This suggests that teachers' noticings in tags may have provided data for them to engage in thought experiments beyond the bounds of the video while using the commenting tool. For example, in a video of a teacher engaging her students in a "true or false?" routine, she substituted the letter "a" for a number and asked her students what it meant. Her students conjectured that the letter "a" in the equation meant the number "1" because "a" is the first letter in the alphabet. Another teacher tagged this moment, saying: "I think that it was so brave of you to put the equation with the letters up there for them. They took on the challenge so well!" Then, the same teacher used the commenting tool to remark: "The reasoning behind the 'a' being the number 1 is fascinating to me. I wonder what would happen if you gave them another equation with a different letter in it or more than one letter. It would be interesting to see if some would try to turn it into the letters place in the alphabet again." In this example, the non-teaching teacher noticed the teacher's decision to give students an equation with letters substituted for numbers, and that students "took on the challenge so well" in response to that decision. Then, in her comment, the non-teaching teacher appeared to further specify and draw from her tag-noticing to engage in a thought experiment when she began, "I wonder…," positing how students might respond if the teacher extended the activity in particular ways. Such thought experiments functioned to leverage teachers' noticings to support them in exploring and conjecturing about what could have or might happen under different conditions.

These findings extend results found in the context of in-person professional development that noticing and engaging in thought experiments are two different but interrelated processes (Baldinger & Munson, under review). Even when opportunities for interaction with classroom activity and colleagues were asynchronous, teachers generated data through noticing that fueled their thought experiments. Further, if we want teachers to both notice specifics *and* use those specifics to learn something more general in the context of an online course, this study shows that having both tagging and commenting tools can be supportive. Because of these differences between the tools, we conjecture that the tagging tool is a generative forum for creating a pool of noticing data, and the commenting tool, when used after the tagging tool, is a generative forum for implicating based on noticing data. The affordances of immediate, embedded tagging and summative comments complement, rather than duplicate, one another, generating both specific noticing data and implications for teaching and learning. Future work might further investigate the relationship between the tagging tool and the commenting tool to deduce the ways in which they complement each other to support teacher thinking and learning. One key question worthy of future exploration is how thought experimentation may be related to the development or use of responsive teaching, which requires that teacher quickly notice and consider how to respond to opportunities to support student thinking.

References

Baldinger, E.E. & Munson, J. (under review). Developing adaptive expertise in the wake of rehearsals: An emergent model of the debrief discussions of non-rehearsing teachers.

Colestock, A. A., & Sherin, M. G. (2015). What teachers notice when they notice student thinking. In A. D. Robertson, R. E., Scherr, & D. Hammer (Eds.), Responsive teaching in science and mathematics, (pp. 126-144). New York, NY: Routledge.

Munson, J., Baldinger, E.E., & Larison, S. (under review). What if...? Exploring thought experiments and non-rehearsing teachers' development of adaptive expertise in rehearsal debriefs.

Sherin, M. G., Jacobs, V. R., & Philipp, R. A. (2011). Situating the study of teacher noticing. In M. G. Sherin, V. R. Jacobs, & R. A. Philipp (Eds.), Mathematics teacher noticing: Seeing through teachers' eyes (pp. 3–13). New York, NY: Taylor & Francis.