Is the Medium the Message? Video-Recording and Writing for Approximations of Practice

Yvonne Lai (University of Nebraska-Lincoln)
Alyson Lischka (Middle Tennessee State University)
Jeremy Strayer (Middle Tennessee State University)

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In 1964, Canadian philosopher Marshall McLuhan proposed a then-radical idea in media theory: We should study not only content of messages, but also the impact of the medium itself, on society. He captured this idea in the phrase: The medium is the message. We take this idea into the study of teachers' approximations of practice. We ask: *Can the creation medium impact teachers' approximation of practice, especially their recomposition of practice*?

The purpose of the study reported in this paper is to investigate differences in how prospective teachers may decompose and recompose practice during video and written approximations of practice. By written approximation of practice, we refer to a response to an assignment such as producing (parts of) a lesson plan; by video approximation of practice, we refer to a response to an assignment such as video recording oneself responding to a (hypothetical) student.

This study is part of a larger endeavor, the Mathematics of Doing, Understanding, Learning, and Educating for Secondary Schools (MODULE(S^2)) project, which has developed materials and designed associated faculty professional development for content courses for prospective secondary teachers, in the content strands algebra, geometry, statistics, and mathematical modeling. This study draws on data from prospective teachers enrolled in geometry courses using the materials.

We draw on the perspectives of social constructivism and systemic functional linguistics. Like Tzur (2001), we posit "the centrality of social interaction to the very process of reflection" and "the rejection a positivistic view of the mind and epistemological emphasis of the role of human experience in the formation of knowledge" (p. 261). Following systemic functional linguistics, we view language as having metafunctions: ideational, which among other features shows one's interpretation of logical relations; interpersonal, to enact interpersonal relations; and textual, to create the words (or diagrams) used (Halliday, 1985).

Additionally, we posit that learning to teach is not only about recomposing teaching practice per se, but also about recomposing disciplinary understanding with teaching practice. In our work, that discipline is mathematics. This problem of integrating mathematics with teaching is especially critical in secondary mathematics teacher education. Many teachers leave their programs finding their mathematical experiences irrelevant to their teaching (e.g., Ticknor, 2012; Wasserman et al., 2018; Zazkis & Leikin, 2010) This is unfortunate given the need for specialized mathematical knowledge in secondary teaching, which goes beyond high school knowledge (e.g., Baumert et al., 2010; Heid, Wilson, & Blume, 2015; Wasserman, 2018). Our approach to mending this disconnect is embedding approximations of practice into content courses. Following Rowland (2013), we conceptualize the use of mathematical knowledge in teaching as being visible in various dimension, including Foundation and Contingency.

Our data is drawn from a pool of over 300 approximations of practice from 93 teachers. We

examined a purposive set of 31 approximations of practice selected to document the range of mathematical knowledge based on pre/post performance on the GAST, an instrument validated to measure mathematical knowledge for teaching geometry (Mohr-Schroeder et al., 2017). We designed prompts for written and video approximations to enact the same teaching practice (providing feedback to students), while addressing the same particular mathematical content (definitions of geometric transformations). Similar sample student work was provided for both. In our analysis of these approximations of practice, we focused on ideational metafunction: how the prospective teachers may have construed relations among mathematical knowledge (conceptualized as Rowland's (2013) Foundation dimension) and different components of the focal teaching practice, such as attending to student work, interpreting the student work, and advancing the students' thinking (conceptualized using Rowland's (2013) Contingency dimension).

We argue that attending to potential differences in video and written approximations of practice is critical to developing prospective teachers' capacity for recomposing teaching practice. Written approximations of practice and video approximations may constrain and afford teachers' capacity differently. In our analysis, prospective teachers were more likely to compartmentalize components of teaching practice in video approximations of practice without explicit references to components placed before or after, as well as alternate between foundation knowledge and contingency knowledge with fewer turns. However, in written approximations of practice, teachers were more likely to weave the components fluidly, making references to each other, and with more interweaving. A visual metaphor for this interweaving is shown in Figure 1.

However, in video approximations of practice, prospective teachers seemed to go into more depth in analyzing and interpreting sample student thinking, as compared to in written approximations of practice.

Finally, we note that we found no relationship between the sophistication of Foundation or Contingency knowledge and the interweaving, as coded using an adaptation of the framework in Lai et al. (2019). Interweaving of Foundation and Contingency seems to be more a function of the medium rather than knowledge.

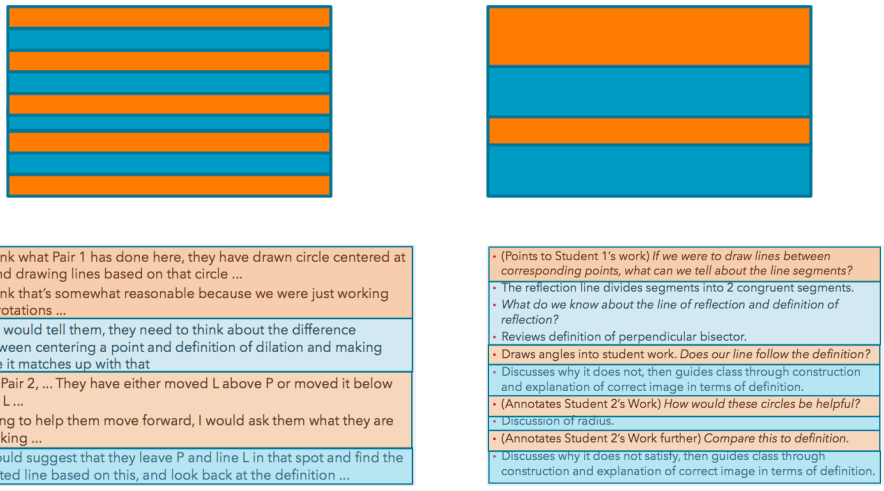

Figure 1. Visual metaphor illustrating interweaving, with two descriptions of one prospective teacher's video and written approximations of practice, overlaid with metaphor

Rougée and Herbst (2018), as well as Amador et al. (2017), in comparing storyboarding to written text, suggested that different media have different affordances for teacher education. Our study adds to the compelling case that the medium impacts the message, that is, how prospective teachers' construal of practice may be contingent on the medium in which they do so.

Our results also lead us to problematize the conception of medium as it has to do with studies that compare teachers' approximations of practice. Typically, the medium is simply the tool used to produce the approximation. However, in our experience with this study and with the materials development process, the use of the medium might be mediated by the instructions given to students to use that medium. In previous iterations of the instructions given for the written approximation of practice in the MODULE(S^2) geometry materials, the teachers saw bullet pointed components. A preliminary comparison of these approximations with the ones examined for this study, where the instructions were given in paragraph form rather than bullet points, suggested that teachers were more likely to view mathematics and teaching as disjoint rather than interwoven.

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