

## THE INFLUENCE OF HIGH SCHOOL TEACHERS' CURRICULAR NOTICING ON PLANNING

Ariel Setniker

California State University Maritime Academy University of Nebraska-Lincoln  
asetniker2@unl.edu

Lorraine Males

lmales2@unl.edu

Kelsey Quigley

University of Nebraska-Lincoln

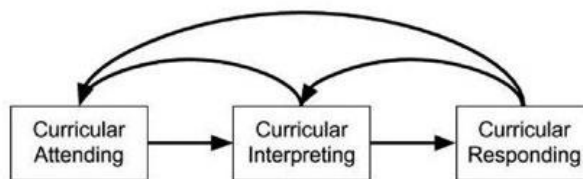
Scott Block

University of Nebraska-Lincoln  
kquigley2@unl.edusblock4@unl.edu

*This paper reports a study of two high school mathematics teachers' interactions with curriculum materials while planning lessons. Specifically, we address how their attention interacts with their interpretations and responses to the materials, and how the curriculum elements and format of each set of materials influenced these interactions. Further, we report on how teachers' noticing informs student opportunities to learn.*

**Keywords:** Curriculum, Instructional activities and practices, Instructional vision

The concept of noticing is not unique to the study of teaching, nor is it unique in the profession of teaching to interactions that occur solely within the classroom. We expand the construct of the professional noticing of children's mathematical thinking (Jacobs, Lamb, & Philipp, 2010) to describe how high school teachers use curriculum materials during planning. Just as Jacobs, et al. (2010) focus on a "specialized type of noticing" (p. 171), the professional noticing of children's mathematical thinking, we focus on a special type of noticing: the noticing of curriculum materials by teachers for the purposes of using the materials with students in their enacted lessons. Curricular noticing is the set of skills that constitute the curricular work of mathematics teaching, namely: curricular attending, curricular interpreting, and curricular responding. Curricular attending involves "viewing information within curriculum materials to inform the teaching and learning of mathematics" (Dietiker, Males, Amador, & Earnest, 2018, p. 523), curricular interpreting involves making sense of that to which is attended, and curricular responding involves making curricular decisions based on the interpretation of curriculum materials. Figure 1 depicts the Curricular Noticing Framework.



**Figure 1: The Curricular Noticing Framework (Dietiker, Males, Amador, & Earnest, 2018, p. 527)**

Although these definitions seem to presuppose a sequence, we argue that the process may not unfold in a strictly linear fashion. For example, while a response is dependent on a curricular

interpretation of that to which a teacher attended, an interpretation may trigger a teachers' attention, or a decision to respond may result in the teacher attending to something new.

### **Purpose and Research Questions**

Our purpose is to describe two high school teachers' curricular noticing during planning and the influence of curricular elements and format on this noticing. Specifically, we address:

1. What do teachers attend to in curriculum materials during planning, and what interpretations and responses do they make in relation to this attention?
2. How might curriculum elements and format influence teachers' curricular noticing?

## **Methods**

### **Participants**

This paper focuses on the planning of two teachers who were part of a larger study of teachers' use of curriculum materials. While both taught in the same district, they presented very different contexts for examining curriculum use. First, the two teachers had varying years of teaching experience, Alice having 9 years and Elise being in her first year. Second, Alice was piloting a new set of curriculum materials for the district, and while Elise was using what the district had been using for years, she was also new to using the materials. In this way, we had the chance to observe their curricular noticing as they were reading materials for the first time.

### **Curriculum Materials**

The materials used by the teachers varied on multiple dimensions. For instance, Alice's materials, the CPM Educational Program's *Core Connections Algebra*, classifies as Standards-Based, meaning that it was designed to align with the NCTM (2000) Standards. Elise's materials, Pearson Education, Inc.'s *Geometry*, is classified as Conventional, meaning that it was developed from editions published prior to the release of the NCTM Standards. Comparing the curriculum use with the differing curricula may provide insight into how the curriculum elements and format might influence teachers' curricular interactions.

### **Data Analysis**

We analyzed eye tracking recordings as well as coded each teachers' transcript. We assigned an Attend code when a teacher looked at or read aloud a section of the curriculum materials, with four subtypes: district-adopted materials, materials from previous lessons (produced by the teacher), old materials (e.g. past lesson plans), and online sources. We assigned an Interpret code when a teacher made sense of the curriculum materials, with three subtypes: the curriculum itself, students (e.g. approaches), or mathematics (e.g. working out solutions). We assigned a Respond code when teachers made a decision as to what to include in their plan, with four subtypes: using something from the materials as is, adapt it, not use it at all, or to supplement.

To address the extent to which each teacher's attention interacted with their interpretations and responses, we examined their thought processes via idea sequences. Each time a teacher focused on one big idea in their planning interview, we defined this as an idea sequence. For example, idea sequences included thinking around a particular concept or commentary around the structure of the overall curriculum materials. To explicitly represent an idea sequence, we recorded the sequence of attention and subtypes of interpretations and responses.

## **Results & Discussion**

### **Idea Sequences**

In order to examine teachers' curricular noticing, we identified idea sequences across each planning session. For example, when our two teachers discussed their final thoughts around selecting examples for a warm-up, we generated the idea sequences in Figure 2.



**Figure 2a: Idea Sequence Example - Alice**



**Figure 2b: Idea Sequence Example - Elise**

In her idea sequence of one minute, 57 seconds, Alice attended to what she reported as student materials from the previous lesson, discussing her interpretation of the meaning of problems near the end. She continued to attend to the student materials, ending with a discussion of doing a warm-up involving assessment, believing her students needed this opportunity. Elise, in 6 minutes, 22 seconds, attended to curriculum materials from her student teaching, searching through worksheets and interpreting the meaning of problems as she looked for a specific focus. Elise eventually found problems to use, and as she copied them into her class slides, she further interpreted their meaning and how her students would respond. Following these, Alice and Elise moved on to new ideas and thus we defined the next idea sequence of their planning periods.

Despite the different experiences of the two teachers and the different curriculum materials, Alice and Elise had a similar number of idea sequences in their planning. Alice's thought processes are represented by 7 idea sequences, Elise's by 8. This similarity is especially notable when compared to the overall planning times, with Alice spending about 18 minutes and Elise about 57 minutes. We see this more clearly by considering our two teachers' average idea sequence duration - Alice with two minutes, 10 seconds and Elise about 7 minutes. Further, we see a widely varying range of duration when it comes to the idea sequences - a range of about 9 minutes amongst Alice's idea sequences, and a range of about 23 minutes amongst Elise's.

A previous study (Males & Setniker, 2018) indicated that prospective secondary teachers always began to work with new ideas by attending to curricular resources. In this work, Elise, a secondary teacher in her first year, also began each idea sequence with attention to a curricular resource. In comparison, Alice began one of her thought processes by making interpretations about her students from past experiences, which seemed to influence what she was searching for.

Our analysis also indicates that idea sequences are longer in duration across teachers for specific curricular elements. For example, Alice's longest idea sequence is almost 9 minutes, which involved comparing closure problems. Elise's idea sequence around closure is about 6 minutes. In contrast to such similarities amongst Alice's and Elise's idea sequences, those of short duration are not focused on the same thought processes across the teachers. However, we see that while the durations of our two teachers' planning sessions and the duration of the idea sequences within were quite different, they still had similar thought processes defining separate idea sequences, though not necessarily in the same order.

### **Curricular Elements and Format**

Each set of curricular resources used by our two teachers was comprised of numerous individual curriculum elements. In this section, we describe the attention to select elements in order to understand how curricular elements and format influenced teachers' noticing.

Alice expressed her general appreciation for the approach of her district-adopted curriculum and furthermore, her familiarity with the format and elements through professional development and some previous collaborative planning. Elise also had a general approach to her curricular resources, in that she did not use her district-adopted curriculum very often. We see that Elise had a skeptical approach to elements in the district-adopted book, through the lens of a short class time, and yet was optimistic about almost any other element she found in other resources.

Further, the degree to which teachers' beliefs are aligned with curricular goals seems to play a large role in approach to curriculum materials and what they notice. For example, Alice had the goal of keeping her students engaged. Throughout planning, this goal was a driving force in analyzing the materials and choosing what to include in her plan.

### **Conclusion and Implications**

Studying the two teachers' interactions while planning with their district-adopted and chosen curriculum materials provided insight into their curricular noticing and how it is influenced by the type of curriculum and also teacher predisposition and beliefs. Before teachers decided what to include in their lesson plans they attended to materials. This was evidenced by an attend code prior to a response code in each of our idea sequences. However, not every idea sequence started with an attend code - specifically, Alice began an idea sequence with an interpretation around students. This was steered by her strong beliefs around student engagement, and with this in mind began a new idea sequence focused on engagement. This was perhaps due to her years of teaching experience and/or her personal views of her students' needs.

While engaging in curricular noticing, teachers were attending simultaneously with interpreting or responding. Our idea sequences indicate that teachers were looking for particular elements that supported their personal beliefs, interpreting the meaning behind various tasks and problems while doing so. For example, Elise, while searching for a problem says "That's a fun problem...it's a converse...see why do they throw area in right there? ...no, alright, that's a good question. They actually need area this time around." Here Elise interprets the point of the question and returns to the objective sheet to confirm that her students have learned area before.

This study contributes to expanding the construct of noticing and understanding how curriculum materials influence teachers' planning and students' opportunities to learn. First, this corroborates the research that indicates that teachers' beliefs and predispositions influence their curriculum use, particularly their attention to certain curricular elements. Further, familiarity with curriculum materials aids teachers in navigating format. However, this may result in important teacher suggestions and opportunities for student learning being missed. Not all elements were attended to in each curricular resource, and even some elements which were attended to were not attended to for more than two seconds. It is likely difficult for teachers to interpret and respond to curriculum materials to plan and enact instruction if they have not attended to the curriculum materials. Therefore, this attention largely influences what students have the opportunity to learn. This underscores the importance of future work describing how curriculum developers and teacher educators may support teachers in optimizing attention to critical curriculum elements.

### **Acknowledgments**

The research in this article was supported by the National Science Foundation (#1651836).

### References

- Beyer, C.J., Delgado, C., Davis, E.A., & Krajcik, J. (2009). Investigating teacher learning supports in high school biology curricular programs to inform the design of educative curriculum materials. *Journal of Research in Science Teaching*, 46, 977-998.
- Dietiker, L., Kysh, J., Sallee, T., & Hoey, B. (2014). Algebra Core Connections. Sacramento, CA: CPM Educational Program.
- Dietiker, L., Males, L. M., Amador, J. M., & Earnest, D. (2018). Curricular noticing: A framework to describe teachers' interactions with curriculum materials. *Journal for Research in Mathematics Education*, 49, 521-532.
- Jacobs, V. R., Lamb, L. L. C., & Philipp, R. A. (2010). Professional noticing of children's mathematical thinking. *Journal for Research in Mathematics Education*, 41(2), 169–202.
- Males, L. M. & Setniker, A. (2018). Planning with Curriculum Materials: Interactions between Prospective Secondary Mathematics Teachers' Attention, Interpretations and Responses [Special issue]. *International Journal of Educational Research*.