

Chapter 7

Using Photographs and Learning Trajectories to Enhance Teacher Noticing to Support Formative Assessment

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ABSTRACT

In this chapter, the authors propose a re-imagined framework for formative assessment that weaves professional teacher noticing with the use of learning trajectories and photographs. Photographs can be used to capture “disappearing data” in early childhood mathematics classrooms as a way of documenting children’s mathematical thinking and used in data analysis for formative assessment. A case study, including a series of photographs of a single child’s work on a one more/one less task is used to demonstrate the ways in which this new framework can be used as part of a coaching cycle aimed at improving formative assessment. The coach supports the teacher in using photographs to document student thinking; employing professional noticing coupled with learning trajectories to identify where the student’s work is along the Base 10 progression of counting; and synthesizing noticings and trajectories to plan instructional next steps. Implications for both teaching and research are identified and explored.

INTRODUCTION

Photographs, learning trajectories, and the framework of professional teacher noticing (Jacob, Lamb, Philipp, & Scheppele, 2011) can be effective formative assessment tools for early childhood educators when considering students' understanding of mathematical concepts. Ebby & Petit (2018) suggest learning trajectories can support formative assessment, since they are a representation of how children's mathematical understanding develops. Pairing photographs that capture children's work with learning trajectories can be used as a tool for formative assessment. Making sense of a learning trajectory and analyzing the evidence in the photographs along the progression can be a meaningful way to assess children's thinking. From this, teachers can make thoughtful and data-based instructional decisions. Through formative assessment, teachers are engaging in professional teacher noticing (Jacob, et al., 2011) – attending, interpreting, and responding to children's thinking – when engaging with photographs and learning trajectories in this way.

The Problem: Disappearing Data

In Early Childhood education, there are two barriers to effective formative assessment practices: simple content and disappearing data (e.g. Howe, 2018). The content of early childhood mathematics is often misidentified as *simple* by those who dismiss the concepts of Counting and Cardinality, considering them to be content without nuance. In fact, the opposite is true, and there is significant complexity to children's understanding of this foundational content (Ginsburg, Inoue, & Seo, 1999; Sarama & Clements, 2009). Learning trajectories reveal the many layers of complexity in mathematical content by describing the various ways children tend to make sense of specific mathematics content. In the Counting and Cardinality domain (NGA & CCSSO, 2010), learning trajectories reveal stages beginning in pre-counting and moving to more complex unitizing, such as counting by 2's or 5's (e.g. OGAP LLC, 2017). Research suggests that the use of learning trajectories may increase children's achievement and motivation and improve teacher knowledge (Clarke et al., 2001; Clements, Sarama, Spitler, Lange, & Wolfe, 2011; Supovitz, Ebby, Remillard, & Nathenson, 2018; Wilson, Sztajn, Edgington, & Myers 2015), as learning trajectories aid teachers in noticing specific strategies and analyzing student understandings of that content. Much of the mathematics young children engage in happens through play (Ginsburg, Inoue, & Seo, 1999) or in settings where collecting classroom artifacts or documenting student thinking and work is challenging. We refer to this as “disappearing data,” the work that students do with blocks, manipulatives, or in play that cannot be preserved like written work because it gets put away at the end of the math lesson. The disappearing nature of children's work makes it difficult for teachers to capture data that illuminates children's mathematical understandings, a necessary component in planning future instruction.

We begin this chapter with a review of the literature in which we connect the frameworks of formative assessment and professional teacher noticing with the use of learning trajectories. Next, we provide a case study of a teacher and her mathematics coach who used photographs and one cycle of teacher noticing (i.e., attending, interpreting, and responding) to analyze formative assessment data. This case features a specific learning trajectory, OGAP Base Ten Number Progression (Appendix A; OGAP Math LLC, 2017), and its use in combination with photographs taken during a mathematical task aligned with the Counting and Cardinality standards (NGA & CCSSO, 2010). Teacher educators, mathematics coaches, professional development providers, and teachers can use this case study and corresponding discussion

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