EXPLORING THE AFFORDANCES OF ASSESSING COUNTING WITH CHALLENGING TASKS

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Young children's counting is typically assessed in terms of its correctness using simple, narrow tasks (e.g., oral counting, counting small sets of objects, or counting sets of images on paper). However, recent work suggests attending to preschoolers' counting in the context of more challenging tasks (e.g., sets of objects greater than 20) can reveal understanding not captured by common measures (Franke et al., 2020; McMillan et al., 2024).

In this study we report on an assessment of early numbers that included both common and challenging measures of young children's counting. We conducted 69 counting interviews with preschoolers aged 37-56 months that included counting an unorganized collection of 31 pennies, sets of 4 and 12 bunny erasers, and a set of 21 gems of different colors. Data analysis focused on children's use of the standard number sequence, one-to-one correspondence, and cardinality. In investigating young children's counting within the context of an assessment interview, our goal was not to determine whether or not a child's mind holds knowledge of a given mathematical concept or skill, but rather to explore how the details of their participation reveal emerging understanding of counting as a social practice.

Thirty-nine children (64%) reached their highest count on the pennies task. For example, Manuel (50 months) counted pennies using the sequence "uno, dos, tres, cuatro, cinco, seis, siete." This count exceeded Manuel's counts of 4 and 6 on the oral and gems task, respectively. Just as Manuel, many students reached different maximums on the aloud, pennies, and gems task with only 10% of students reaching the same maximum on all three. However, choosing to only track conventional counting and maximum number can underestimate other aspects of children's counting. Our analysis found that 20 children's ability to count using one-to-one correspondence exceeded their ability to articulate the standard number-word sequence. For example, Nate (52 months) was able to reach a maximum (standard) count of 13 counting aloud and counting pennies. However, his use of the sequence "1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16, 17, 18, 19, 20, 13…" when counting pennies revealed that he was able to coordinate unique number names with 18 items, even if only 13 were conventional. Inviting children to count unorganized, large collections of objects can illuminate aspects of student counting that are not captured by conventional measures. Conceptualizing children's engagement in counting as problem solving activity requires a reconsideration of what are commonly characterized as "mistakes" or "errors" in children's counting. Our data reveal that such instances often provide evidence of emerging understanding, even if the child is still grappling with the specifics of how to coordinate the number sequence with each object.

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