Designing Tools to Describe Mathematics Classrooms from the Perspectives of Children

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Participant focus of 20 years of early childhood articles from JRME and JMTE

- Children
- Preservice Teachers
- Practicing Teachers
55 total articles focusing on children

- School Settings
- Clinical settings
- Out of school
“Despite Day 1 being the students’ first collective entrée into defining, they participated in all aspects of definitional practice, although some aspects were more salient than others. Students most frequently reasoned about systematic relations (e.g., a square is a polygon), but also spent considerable time constructing definitional explanations or arguments, evaluating examples, describing properties, and proposing definitions,” Kobiela & Lehrer, 2015, p. 438-439).
Students as Evidence

The Development of Children’s Algebraic Thinking: The Impact of a Comprehensive Early Algebra Intervention in Third Grade

Maria Blanton, Ana Stephens, Eric Knuth, Angela Murphy Gardiner, Isil Lsler, & Jee-Seon Kim

This article reports results from a study investigating the impact of a sustained, comprehensive early algebra intervention in third grade. Participants included 106 students; 39 received the early algebra intervention, and 67 received their district’s regularly planned mathematics instruction. We share and discuss students’ responses to a written pre- and post-assessment that addressed their understanding of several big ideas in the area of early algebra, including mathematical equivalence and equations, generalizing arithmetic, and functional thinking. We found that the intervention group significantly outperformed the nonintervention group and was more apt by posttest to use algebraic strategies to solve problems. Given the multitude of studies among adolescents documenting students’ difficulties with algebra and the serious consequences of these difficulties, an important contribution of this research is the finding that—provided the appropriate instruction—children are capable of engaging successfully with a broad and diverse set of big algebraic ideas.
Conceptualizing Mathematically Significant Pedagogical Opportunities to Build on Student Thinking

Keith R. Leatham, Blake E. Peterson, Shari L. Stockero, & Laura R. Van Zoest

The mathematics education community values using student thinking to develop mathematical concepts, but the nuances of this practice are not clearly understood. We conceptualize an important group of instances in classroom lessons that occur at the intersection of student thinking, significant mathematics, and pedagogical opportunities—what we call Mathematically Significant Pedagogical Opportunities to Build on Student Thinking. We analyze dialogue to illustrate a process for determining whether a classroom instance offers such an opportunity and to demonstrate the usefulness of the construct in examining classroom discourse. This construct contributes to research and professional development related to teachers’ mathematically productive use of student thinking by providing a lens and generating a common language for recognizing and agreeing on a critical core of student mathematical thinking that researchers can attend to as they study classroom practice and that teachers can aspire to notice and build upon when it occurs in their classrooms.
A few exceptions

“Of the three groups, Group A provided the most prominent example of an expert–novice distinction between the members of the group. Eileen performed the K1 move in 54% of the total knowledge exchanges, more than twice as frequently as anyone else in her group. Eileen also performed the K2 move less than half as frequently as anyone else in her group. All four of the action exchanges in Group A included a command to “wait,”” (Djarnette & Gonzalez, 2015, p. 398).
Prekindergarten
Students have been counting the number of dots on the board. Imani has not been called on. When the students get restless, the teacher says:

I see Imani sitting with her legs crossed and her hands in her lap. Who else can sit like Imani?

**Teacher:** Everybody look at number one. We are going to read these without doing them first, and when we get finished reading all of them you can go back and do them. We may work with a partner. Number one. I like Imani’s finger in the box we are talking about. Thank you Imani.
Eliot

Preschool

**Teacher**: (to James) All right. Can you show me six?

**James**: 1 …

**Eliot**: (interrupting) 2, 3, 4, 5, 6, 7, 8, 9, 10.

**Teacher**: Shhhh! (To Elliot).

First Grade

Eliot has been asked to explain why 2, 4 & 7 are not a fact family.

**Eliot**: Four fingers, and I added two more. One. Two, and I got six. And then, I know four plus two is not seven. The answer is six.

**Teacher**: Good job, Eliot! Did ya’ll hear what he said? Very good!
Teacher: Okay, let's count class. Clay, I need you to be on your bottom.

Teacher and children: 1, 2, 3, 4, 5, 6.

Teacher: Clay, count those for me.

Jeremiah: Can I be a big helper?

Teacher: If you sit down (turns back to Clay.) Ok, do it again. Hold it up so I can see it, ok? Can you hold it up?

Clay: 1, 2, 3, 4, 5, 6.

Teacher: Good job.

Teacher: Ok, raise your hand if you would like to share something with the group about what you learned today. Clay?

Clay: How to use a numberline.

Teacher: Could you tell us how we use our numberline?

Clay: By jumping those spaces. Jumping to the next or jumping back.

Teacher: Are we going forwards or backwards when we do that in subtraction?

Clay: Backwards.

Teacher: In subtraction the big number comes first. Keep that in your head. Now turn to your neighbor and tell them what I said. (Pause.) Oh, Clay. They didn't hear me. Only you heard me.
Advice?