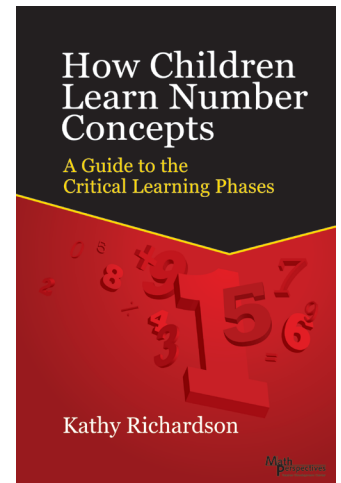




How Children Learn Number Concepts

by Kathy Richardson



Suggested Questions for Study

Introduction

1. Think of a time that you revealed an “illusion of learning” when working with a student. How did you respond? What changed (or did not change) in your instruction?
2. What does understanding of number concepts look like? How do you know when a student understands a concept? Why is it important that we take the time build a conceptual foundation for students?

Chapter 1

3. Do you remember learning to count? Most of us have little recollection of our own progression through the Critical Learning Phases related to counting. What surprised you about the many stages of learning that students pass through as they learn to count? How does this relate to your experience in the classroom?
4. Students’ reactions to their own counting provide insight into their understanding. What kinds of responses are discussed in the chapter? What does each of these responses tell you about students’ understanding of counting?
5. Consider your own instructional materials in light of the Critical Learning Phases for counting. How do they help students progress through the phases? What would you change to be sure students have a solid foundation related to counting?
6. As they work with numbers, students progress from concrete models, to representations, to abstract or symbolic notation. Discuss an example of each, considering the content in this chapter.

Chapter 2

7. A key skill related to changing numbers is being able to see a smaller number as part of or “inside” a larger number. What tools and instructional strategies do you use to help students develop an understanding of parts of a number?
8. Depending on how they are used, there is some ambiguity in the words “more” and “less” relative to comparing numbers. How can we help students formalize their mathematical language while still respecting their informal language that demonstrates their understanding of the concepts?
9. Comparing groups that are lined up is a prerequisite skill to comparing groups that are not lined up. What challenges are presented to students when the groups are not lined up?

Chapter 3

10. How can you help students develop an understanding of number concepts that are represented symbolically? Why does this matter?
11. Consider the three student stories on pages 48 and 49. Discuss each story, thinking about each student's progression through the Critical Learning Phases.
12. When learning parts of numbers, "This whole process takes a long time, especially for a 6-year-old child." What strategies do you use to differentiate the instruction in your classroom to accommodate students at various stages in the process? What would you do differently?

Chapter 4

13. Read the classroom examples on pages 76 and 77. When have you seen students in your classroom struggle with these concepts? Are there specific examples of students who did and did not understand place value?
14. Models for tens and ones need to be clear and straightforward. What kinds of models might complicate students' learning of place value concepts? What examples can you think of that are clear and straightforward?
15. How do the Critical Learning Phases related to place value help students develop an understanding of addition and subtraction to 20? To 100?

Chapter 5

16. What challenges are presented to students when exploring place value with numbers greater than 100? What are some examples of strategies that help students develop an understanding of hundreds, tens, and ones?
17. Two of the Critical Learning Phases deal with knowing parts of 100, both in tens and also in tens and ones. Think about your experience using parts of 100. How do you help students build this same familiarity with the parts of 100?
18. How does developing an understanding of the Critical Learning Phases related to place value help students break apart and recombine groups of hundreds, tens, and ones when adding and subtracting?

Chapter 6

19. We often introduce multiplication through its relationship to addition. In what ways is multiplicative thinking actually different from additive thinking? How does this relate to your current instructional practices?
20. Five different multiplication situations are identified on pages 155 through 157. For at least three of these situations, find an example in your current instructional materials that illustrates the situation. What strategies do students need to use to solve each problem?
21. How do rectangular arrays help students better understand multiplication? What prerequisite understandings do children need to possess in order to make this a useful tool? When have you seen students struggle with the array model for multiplication?

General Questions

22. Each chapter in the book discusses the role of symbols in students' understanding. What general statements can be made about the use of symbols? How do you help students as they transition from hands-on models to symbolic representations of the mathematics?
23. In order to use formal mathematical language, students need to see it modeled regularly. What examples did you find in the book of formal language that may be confusing to students? How can you model the appropriate use of this language, helping students progress to using formal language?