Whole Number Addition & Subtraction in Kindergarten

How Does Fluency Build from Conceptual Understanding in Kindergarten?

Students flourish in mathematics when procedural fluency builds from a foundation of conceptual understanding, reasoning, and problem solving. When students make connections between concepts and procedures, they become confident mathematicians. This enables students to know which procedure is appropriate for a given situation and helps students anticipate their answers when using a selected procedure.

In Kindergarten, students are expected to fluently add and subtract within 5. This means that they can quickly tell sums and differences for numbers to 5 without counting one by one. Kindergarten students also use concrete objects to solve addition and subtraction word problems within 10, and represent addition and subtraction in a variety of ways, including mental images, drawings, sounds, acting out situations, verbal explanations, or expressions. Many other kindergarten skills support students' ability to quickly know facts within 5 and use strategies to solve problems within 10, including learning the counting sequence, developing cardinality, learning to subitize (instantly recognize and combine sets), and recognizing that numbers can be composed and decomposed in different ways.

Problem:
Lily has two red grapes and three green grapes. How many pieces of candy does Lily have?

I know 2 and 3 more is 5.
Known fact

I started at 3 and counted on two more That's 5.
Counting on

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What Role Does Problem Solving Play?

Problem solving is an opportunity for students to select, use, and adapt computation strategies. It promotes reasoning, sense making, formulating conjectures, and seeing connections. As students solve problems, they need time to discuss their ideas with classmates and the teacher in order to know why a specific computation is needed to solve a problem.

3+2 has the same value as 2+3.

My conjecture is that whenever I flip two addends, the total will stay the same.

Conjecture: an opinion about what you believe is true based on some information

When students are given problems and allowed to select procedures meaningful to them, they naturally build upon their current understanding to construct their own strategies. Students adapt these strategies as they work together and share ideas. Initially, students use visual representations to model actions and relations in problems. Next, they begin to use more efficient counting strategies. Eventually, through varied problem solving experiences, students move toward use of number facts.

In Kindergarten, students are expected to solve the following problem types:
- **Add to/Take From** - Result Unknown
- **Put together/Take Apart** - Total Unknown, Both Addends Unknown

The problem type influences the strategies students use to solve it. To learn more about these problem types and problem solving strategies, visit NCDPI's Kindergarten Unpacking Document.

What is Procedural Fluency?

Procedural fluency is being able to apply procedures efficiently, flexibly, and accurately.

- **Efficient:** Select a strategy within a reasonable amount of time.
- **Flexible:** Know multiple strategies; apply or adapt strategies when needed.
- **Accurate:** Solve Correctly.

Procedural fluency is broader than basic fact fluency, which only involves single-digit numbers.

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What are the Actions of a Fluent Kindergartener?

Component	Action
Efficient	Select an appropriate strategy. Easily use the strategy. Add and subtract within 5 in a reasonable amount of time. Produce facts within 5 from memory through reasoning or recall. Add and subtract within 10 using objects, drawings, or other representations.
Flexible	Use strategies including • Know +1 is the next counting number. • Count on to add. Example: *I add 3 + 2 by counting on from 3. I say 3…4, 5.* • Count back to subtract. Example: *I subtract 5 - 2 by counting back from 5. I say 5…4, 3.* • Compose and decompose numbers within 10 in different ways. • Use the commutative property to add. Example: *Since 2 plus 1 equals 3, I know 1 plus 2 equals 3.* Adapt a strategy to fit the numbers or situation. Trade out strategies if the first one isn't helpful or becomes cumbersome.
Accurate	Complete steps accurately. Get the correct answer.

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Kindergarten Resources to Build Conceptual Understanding and Develop Fluency

- **Painted Numbers** / **teacher slides** (lesson), *Tools4NCTeachers*
- **Same but Different** (activity), *Math Learning Center*
- **Bears Race to Ten** (game), *Math Fact Fluency Companion Website*
- **How Many More Buttons, pp 5 and 27** (game), *NCDPI*
- **Ten Frame Mania** (game), *Tang Math*
- **The Pocket Game**, (game) *YouCubed*
- **Sum of 5** (task), *Open Middle*
- **Tipped Off** (task), *Graham Fletcher*
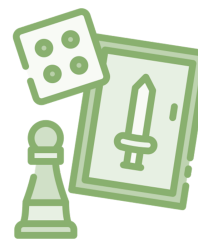
Link to Developing Proficiency with Whole Number Addition & Subtraction