

Assessment for Learning

Helping Children Build on What They Know

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Paper presented at the annual meeting of American Educational Research Association, April 2023, Chicago, IL

*Preparation of this report was supported by the National Science Foundation through Grant #1621470 and #2201939 to the first author and Grant #1813737 to the second author.

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Mr. Ellis Reviews His First-Graders' End-of-Unit Math Test

(informative test)



#@\$%&!,
after all that drill,
they should have done better
than this on the test of
addition facts.

Three Things That Would Have Helped Mr. Ellis' Students to Achieve Fluency with the Basic Sums Better

- Focus on **meaning learning and memorization** (instead of learning and memorization by rote).
- Use **learning progressions** (theory- and research-based sequences of knowledge and thinking) to ensure new instruction is meaningful—that is, builds on what a student already knows.
- Use **formative assessment** to find where a child is on a learning progression and what instruction would be developmentally appropriate.

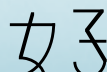
Meaningful Learning and Memorization

Learning the basic addition facts (or any worthwhile knowledge) is like learning Chinese. Sure, you could memorize, for example, the 18 Chinese characters below.

But consider how much easier and effective it would be to look for relations between a symbol and what you know and among the symbols. For example—

* **Two**(many) **Trees** = a '**Forest**, **three** (many, many)**Trees**'= 'Jungle'

* (A man at) 'Peace' = 'Woman' (under his) 'Roof' **Two 'Women**(under a)'**Roof**'= conflict

	brightness		extremely hot		home		roof
	child		fire		month		sun
	dawn		forest		moon		tree
	dense forest or jungle		good		peace		woman
	east				pig		

Learning Progressions Can Help a Teacher Consider Prerequisite Knowledge and Whether a Task is Developmentally Appropriate

Mr. Ellis noted that many of his children were not fluent with more difficult sums such as the near-doubles $8+7$ or even $4+5$.

Understanding the learning progression for mental addition would have helped him recognize that children often build on what they know to devise ingenious strategies for reasoning out relatively difficult sums.

For example, children who are developmentally ready—who are already fluent with the easier facts $4+4=8$ and $8+1=9$ can recognize $4+5$ as $4+4+1$ and use their existing knowledge to quickly reason its sum is 9.

Formative Assessment Can Help a Teacher Locate Where a Child is on a Learning Progression—Whether the Pupil Has Prerequisite Knowledge For a Proposed Learning Task and, If Not, What Task Would Be Developmentally Appropriate

Fluency Adding to 10 (e.g., $4+5=10$)

Fluency Adding doubles (e.g., $4+4=8$), which is helpful in achieving fluency with near-doubles such as $4+5=9$

Fluency Adding with 1 (e.g., $8+1=9$), which is helpful in achieving fluency with near-doubles such as $4+5=9$

Fluency with number after-relations (e.g., after comes nine), which permits fluency adding with 1

**Fluency verbally counting to “ten”
(necessary for fluency with number-after relations)**

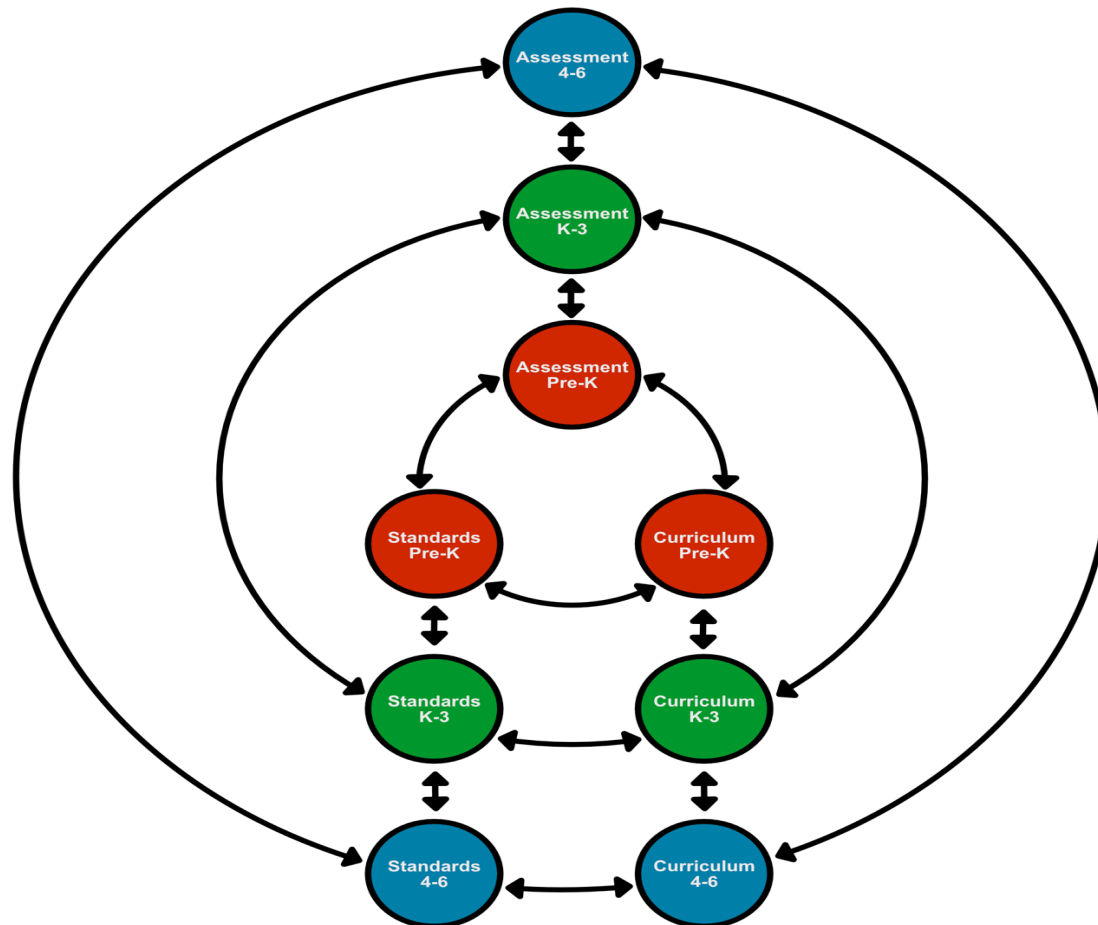
On what step is a student already?
What is an appropriate next step?

Using Formative Assessment in Conjunction with a Learning Progression Can Help Educators Avoid Common Pitfalls

- **Underestimating or overestimating children's existing knowledge.** Familiarity with learning progressions can help educators better define expectations.
- **Focusing on skills.** As learning progression highlight concepts, skills, and their interrelations, instruction based on them can be more balanced.
- **Uncertainty about what to do with a child who is struggling to learn.** Learning progressions can provide a detailed map of what children must already know and the steps needed to make progress.
- **A lack of coordination between levels, such as preschool and the primary grades, or even between grades within a level.** (See next slide.)

Learning Progressions Suggests Educators Take a Long View:
Standards (Goals), Curriculum, and Assessment Need to be Aligned
Across Grade Levels (Vertically) As Well as Within a Grade Level (Laterally)

To ensure his students achieve fluency with relatively difficult sums, Mr. Ellis needs to coordinate his efforts with his district's kindergarten or even preschool teachers (as well as those in grade 2 or even higher).



References

- The following provide more information on **developmental progressions**—including how early number sense supports achieving fluency with basic addition combinations :
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- The following provide more information on **formative assessment**:
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The End

- Thank you.
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