Helping Students Build Computational Fluency Through Independent Practice

What is fluency practice? Fluency is the speed with which students can accurately perform a skill. These practice opportunities can be made more effective through scheduling, and how content is arranged and formatted. Providing scheduled practice opportunities with purposefully arranged and formatted items increases practice effectiveness.

How should practice be scheduled? Practice can be distributed. Distributed practice means providing spaced intervals between unique practice sessions.

How should practice be formatted? Practice should be cumulative and interleaved. Cumulative practice is the systematic addition of a new skill to previously learned skills. Skill A is practiced and acquired before Skill B is introduced. Skill B becomes acquired and practiced with Skill A, and then Skill C can be introduced, and so on. Interleaved practice does the opposite. It mixes up skills, so skills are not practiced consecutively.

How are these topics related? Effective fluency practice is both distributed and cumulative or interleaved. Distributed refers to how it is scheduled, and cumulative and interleaved refer to how the content is introduced and presented to students.

Distributed Practice	Cumulative Practice	Interleaved Practice
Step 1: Identify skills needing distributed practice. Choose skills that are key to understanding future concepts.	**Step 1: Decide if cumulative practice is appropriate to use.** Choose skills that are related in some way and are taught in sequence. For example, schema-based problems could be taught cumulatively.	**Step 1: Select the specific skills that need to be "unblocked."** These should be previously acquired skills.
Step 2: Determine the length between practice sessions. Use 10–20% of the time between practice periods. For example, if students will practice a set of facts for 30 days, 3 to 6 days between sessions is adequate.	**Step 2: Decide the scope and sequence of related skills that will be taught and practiced cumulatively.** Skills may need to be taught in a certain order, especially if some skills are prerequisites.	**Step 2: Interleave the skills.** Skills can be arranged ABC → ABC → ABC, or with more randomization: ACB → BCA → CAB. Both sequences are acceptable (as they unblock AAA → BBB → CCC).
Step 3: Decide on the type of intervals. Intervals can be equal time or expanding over time. Expanding intervals can reduce the overall number of practice sessions without diminishing effectiveness.	**Step 3: Teach, add, and repeat.** As skills are mastered, it is appropriate to move away from the blocked practice embedded in this approach and incorporate interleaved practice.	

How is it different from other common instructional practices? Many teachers use *massed practice*, which is practice of skills in isolation immediately after being taught. These skills may not be revisited. Massed practice can provide short-term gains in skill acquisition, but generally does not support gains over time.

Why should I use independent practice? Practice is both fundamental and essential to building automaticity of academic skills that underly higher-order thinking skills. Independent practice also is a component of explicit instruction.

What are students expected to learn? Independent practice for math can consist of building basic fact knowledge or computational skills.

What should I avoid when using independent practice? Do not assign independent practice activities if students have less than an 85% accuracy rate. Otherwise, students will be reinforcing errors.

What students can this help? All students, but especially students with mathematics difficulty, will benefit from independent and repeated practice.

How do I teach this? Here's an example of a plan for independent practice with number operations. This approach uses distributed, cumulative, and interleaved practice together.

Distributed Practice	Cumulative Practice	Interleaved Practice
Step 1: Identify skills needing distributed practice. The skills of using the standard algorithm for multiplication. Students will practice multiplying single- and multi-digit numbers.	**Step 1: Decide if cumulative practice is appropriate to use.** Cumulative practice is appropriate for transitioning to multidigit multiplication.	**Step 1: Select the specific skills that need to be "unblocked."**
Step 2: Determine the length between practice sessions. Multiplying two-digit by one-digit numbers will be introduced in a month, with 3 to 6 days of practice for the first skill.	**Step 2: Decide the scope and sequence of related skills that will be taught and practiced cumulatively.** Single-digit multiplication will be taught first.	**Step 2: Interleave the skills:** Skill A: Single-digit multiplication Skill B: Two-digit times one-digit multiplication Skill C: Two-digit times one-digit multiplication with regrouping ABC → ABC → ABC
Step 3: Decide on the type of intervals. For this distributed practice, the intervals will be equal.	**Step 3: Teach, add, and repeat.** Students will be frequently monitored for mastery of skills.	1) $7 \bullet 8 = ?$ 2) $11 \bullet 3 = ?$ 3) $21 \bullet 12 = ?$

		4) $5 \bullet 4 =?$ 5) $21 \bullet 5 =?$ 6) $13 \bullet 13 =?$ 7) $4 \bullet 8 =?$ 8) $16 \bullet 8 =?$ 9) $81 \bullet 19 =?$

Distributed Practice	Cumulative Practice	Interleaved Practice
Step 1: Identify skills needing distributed practice. The types of schema will be introduced.	**Step 1: Decide if cumulative practice is appropriate to use.** Cumulative practice is appropriate as students are learning to discriminate between schema types.	**Step 1: Select the specific skills that need to be "unblocked."**
Step 2: Determine the length between practice sessions. As students will be introduced to a new schema each month, 3 to 6 days will be the practice period for the first problem type.	**Step 2: Decide on the scope and sequence of related skills that will be taught and practiced cumulatively.** Additive schemas will be taught first, then multiplicative schemas, then combined schemas.	**Step 2: Interleave the skills:** Skill A: Combine schema Skill B: Compare schema Skill C: Change schema Skill D: Equal groups schema Skill E: Comparison schema Skill F: Ratio/Proportions schema ACEFDB → BDFEAC→ FCABDE
Step 3: Decide on the type of intervals. For this distributed practice, the intervals expand, from 3 days at the beginning of instruction to 6 days at the end.	**Step 3: Teach, add, and repeat.** Students will be frequently monitored for mastery of skills.	

Adapted from Hughes & Lee (2019)