To help students remember key facts, concepts, and knowledge, we recommend that teachers arrange for students to be exposed to key course concepts on **at least two** occasions – separated by a period of several weeks to several months.

Organizing Instruction and Study to Improve Student Learning
(National Center for Education Research, Institute of Education Sciences, 2007)

FAQs

What is spaced teaching and practice?

Spaced practice is "having multiple exposures to an idea over several days to attain learning, and spacing the practice of skills over a long period of time" (Hattie et al. 2017, 129). The term may be used interchangeably with *spaced learning* and *distributed practice*; it contrasts with the terms *massed learning* and *massed practice*. The easiest way to distinguish these ideas is to think about how a topic is taught. Massed learning or massed practice occurs if a large topic of content is taught without interruption (fig. 1). Traditional textbooks in which content is organized into large units or blocks are an example. Learning is spaced or distributed when there are intervals of time between smaller groups of lessons on a given topic (fig. 2). This supports consolidation of the first block of content before the next block is taught and facilitates more deliberate connections between ideas. ORIGO Education has chosen the phrase *spaced teaching and practice* to reflect its unique application of this idea to both teaching and learning.

Massed Learning

Figure 1. A massed learning approach to teaching one year of content.
Different colors represent different math topics.

Spaced Learning

Figure 2. A spaced learning approach to teaching one year of content.
Different colors represent different math topics.

What does spaced teaching and practice look like in ORIGO Stepping Stones 2.0?

The scope and sequence for the first quarter of Grade 3 is shown in figure 3. Different colors indicate the different topics taught.

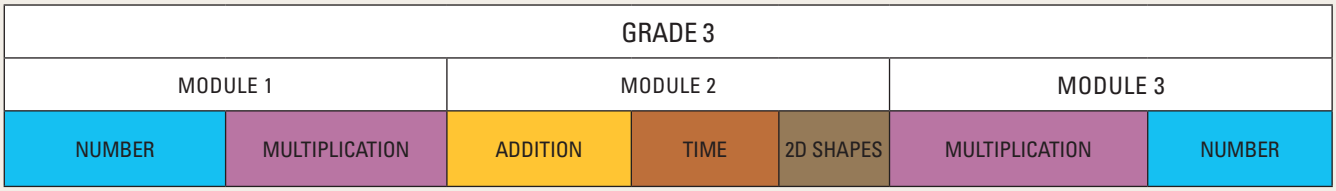

Figure 3. A spaced approach to teaching and practice.
ORIGO Stepping Stones 2.0, Grade 3, Modules 1–3.

As shown (fig. 3), the topic of multiplication is introduced at the end of Module 1, but is not taught again until Module 3. This spaced or distributed approach allows for 12 lessons (roughly three weeks) of practice to consolidate the facts taught in Module 1. In *Stepping Stones 2.0*, this practice takes many different forms to increase student engagement, such as fluency practice, written practice (including puzzles and problem solving), interviews, and games. Lesson notes direct the teacher to each form of practice. Students practice and receive feedback on a regular basis, ensuring they understand – and retain – key concepts.

ORIGO Stepping Stones uses this approach across all grade levels and topics. For major work of each grade, spaced teaching and practice allows students time to consolidate learning about one aspect of the work before they move on to the next. Students may still need to review key topics, but they are less likely to need reteaching. The elements of each topic are deliberately sequenced so key connections can be made. Whether students are relating addition and subtraction in primary grades or using data they have collected to solve problems with the four operations, this approach maximizes opportunities for connection.

What does research say about spaced practice?

Spaced practice has an effect size of 0.65, significantly above the hinge point of 0.40 where influences accelerate the rate of student learning (Hattie et al. 2017). The Visible Learning database summarizes five meta-analyses across more than 500 studies, including more than 165,000 students, which suggests a high degree of confidence (Corwin Visible Learning Meta^{x}, n.d.). In general, research findings suggest that spacing opportunities for learning new content and practicing familiar content yields higher rates of learning and retention. The most frequently cited study is by Cepeda et al., who state:

> When participants learned individual items at two different points in time (spaced learning), equating total study time for each item, they recalled a greater percentage of items than when the same study time was nearly uninterrupted (massed learning). This improvement occurred regardless of whether the retention interval was less than 1 min or more than 1 month. (2006, 365)

Hattie (2008) suggests that it is the frequency of opportunity for successful practice that increases the rate of learning. Students do not need to spend a great deal of time practicing, but they do need to be successful in their practice and receive feedback on their work. This deliberate practice is important; students must practice in a variety of contexts (to support transfer) and make connections between skills and concepts (to deepen conceptual understanding). The work of Donovan and Radosevich (1998) suggests that spaced practice enhances both acquisition of new ideas and retention of familiar learning. Donovan and Radosevich also note that more complex concepts and tasks may require longer periods of deliberate practice than simpler concepts or tasks. ORIGO chooses to deliberately space teaching in order to provide appropriate opportunities for spaced practice.

What do our customers say?

To demonstrate how student learning changes when these ideas are put into practice, we share here data from two school districts that use *Stepping Stones*. School district A, Worcester County Public Schools, MD, shares data from a one-year pilot focused on special education students. School district B, Magnolia Independent School District, TX, reflects longer term change after four years of implementation.

School district A **Worcester County Public Schools, MD**

Figure 4 illustrates the remarkable progress of first grade special education students using *Stepping Stones*. "In all five first grade classrooms that participated in the pilot, the special ed students actually outgrew their general education counterparts" (*Kirsten*, Worcester; Burnett et al. 2018). These students clearly benefited from the careful pacing and structure of content embedded through ORIGO's spaced teaching and practice approach.

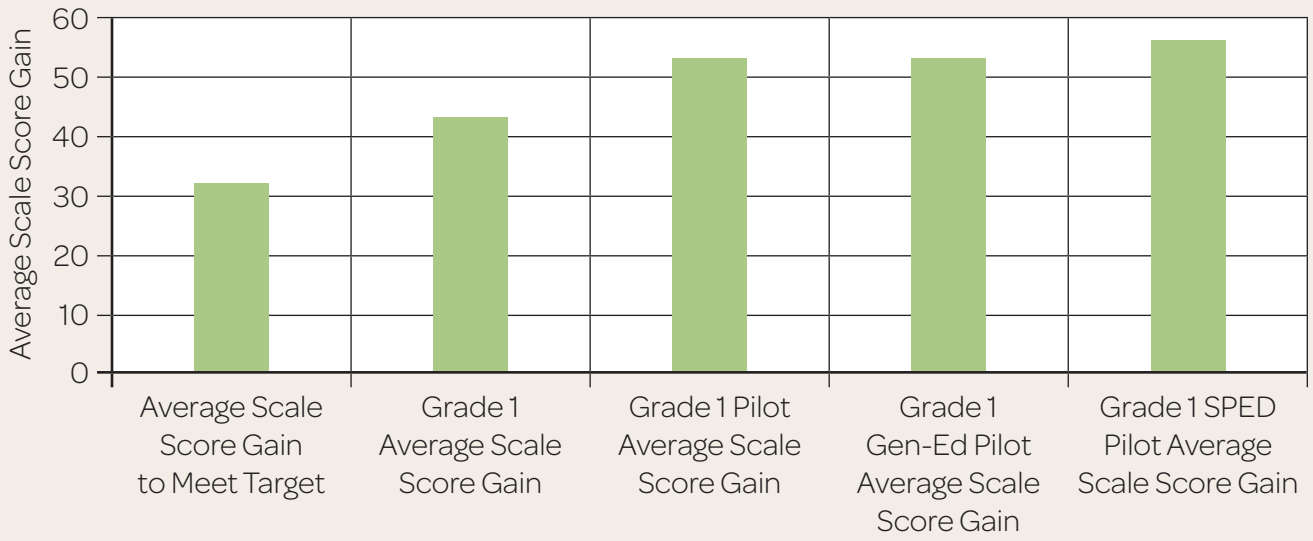

Figure 4. Comparison of i-Ready Average Gain in Scale Score for Grade 1 *Stepping Stones* Pilot (Sept. 2015 to May 2016).

School district B Magnolia Independent School District, TX

Magnolia ISD has used *Stepping Stones* since the 2014–2015 academic year with excellent results (Forward Thinking Edu 2018). Table 1 shows the change in student performance on state assessments in Grade 5 for the 2016–2017 academic year, the third year of full implementation. Green cells represent increasing numbers of students who perform in a given category; each green cell represents an overall increase in student performance. Yellow cells represent a small decrease and red cells would represent a large decrease. In some cases, the overall decreases in performance are due to decreasing student populations at a given school (for example, at Campus 1). This shows that gains are steady or increasing over time (Forward Thinking Edu 2018).

Table 1. Number of students, by school building, who approach, meet, or master grade-level performance in mathematics

	Math 2016			Math 2017 (1st & 2nd Admin)					
Grade 5	Approaches	Meets	Masters	Approaches		Meets		Masters	
Campus 1	94	53	29	89	–5	48	–5	25	–4
Campus 2	95	52	27	90	–5	53	+1	31	+4
Campus 3	79	39	17	85	+6	46	+7	18	+1
Campus 4	89	45	17	91	+2	46	+1	24	+7
Campus 5	84	46	22	88	+4	59	+13	29	+7
Campus 6	87	36	13	96	+9	59	+23	24	+11
Campus 7	83	38	16	90	+7	62	+24	31	+15
Campus 8	94	26	4	93	–1	38	+12	12	+8
District	88	42	19	90	+2	51	+9	24	+5

(Source: Forward Thinking Edu 2018, 6)

To learn more about the success of these school districts, visit the Research and Testimonials section of the ORIGO website (https://www.origoeducation.com/research-and-case-studies/).

References

Burnett, James, Sara Delano Moore, Kirsten Danisavich, & Windy Phillips. 2018. "Steps to Success: Blending Discourse, Conceptual Understanding, and Reasoning in Elementary Math." Workshop, NCTM Annual Meeting & Exposition, Washington, DC, April 25–28, 2018.

Cepeda, Nicholas J., Harold Pashler, Edward Vul, John T. Wixted, & Doug Rohrer. 2006. "Distributed practice in verbal recall tasks: A review and quantitative synthesis." *Psychological Bulletin* 132 (3): 354–380. doi:10.1037/0033-2909.132.3.354.

Corwin Visible Learning Meta^{x}. n.d. "Spaced vs. mass practice." Accessed July 31, 2019. http://www.visiblelearningmetax.com/influences/view/spaced_vs._mass_practice

Donovan, John, & David Radosevich. 1998. "The moderating role of goal commitment on the goal difficulty–performance relationship: A meta-analytic review and critical reanalysis." *Journal of Applied Psychology* 83 (2): 308–315.

Forward Thinking Edu. 2018. *The Impacts of* ORIGO Stepping Stones *on Student Achievement: Magnolia Independent School District, Montgomery County, Texas*. Report prepared for ORIGO Education. https://www.origoeducation.com/wp-content/uploads/2019/ORIGO-Education-MISD-White-Paper.pdf

Hattie, John. 2008. *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Abingdon, Oxon: Routledge.

Hattie, John, Douglas Fisher, Nancy Frey, Linda M. Gojak, Sara Delano Moore, & William Mellman. 2017. *Visible learning for mathematics*. Thousand Oaks, CA: Corwin.

Péladeau, Normand, Jacques Forget, & Françoys Gagné. 2003. Effect of paced and unpaced practice on skill application and retention: How much is enough? *American Educational Research Journal* 40 (3): 769–801.

Walker, Dale, Charles Greenwood, Betty Hart, & Judith Carta. 1994. Prediction of school outcomes based on early language production and socioeconomic factors. *Child Development* 65 (2): 606–621.