WHY *Stepping Stones* is a smarter approach

RATIONALE STATEMENT
For K–5 Mathematics Adoption

Traditionally US programs have content strands encapsulated in a single module or unit. However, a review of what is currently working in countries that outperform the US in mathematics has convinced the authors that many topics should be given in smaller blocks. These blocks, or "spaced-learning experiences," should be spread out across the whole school year.

The expert team of authors and consultants at ORIGO Education utilized all available educational research to create *Stepping Stones*, a revolutionary elementary mathematics program. The scope and sequence of learning experiences was carefully designed to promote deep understanding of mathematical concepts and fluency of skills. Mathematics contains many concepts and skills that are closely interconnected. A good curriculum will carefully build the structure so that all of the pre-requisite topics are in place before the next topics are connected. If this is not the case, then the structure collapses or is at best loosely joined.

In *ORIGO Stepping Stones* the key ideas and skills of these topics have been identified and placed in smaller blocks over time. In the lessons that follow, work is included to master what was taught alongside the other content development. When students come to a new topic, it can be easily connected. Although practice is an essential component of any mathematic curriculum, *ORIGO Stepping Stones* requires less practice time as key ideas are revisited during the course of everyday lessons throughout the year.

See **Topic Sequence Charts** for detailed information on *Stepping Stones* space-learning structure.

STEPPING STONES TEACHING SEQUENCE

Generally there are two content strands represented in a *Stepping Stones* module. The work for the content within the module focuses on the key concepts or skills that are introduced, reinforced, and to some extent practiced. Additional work to "cement" these concepts occurs during the ongoing practice work until the concepts/skills are used to build the next part of the structure. The work cycles through again to extend the use of the concept/skill or to introduce another concept/skill.

In the first stage students are **introduced** to the concept or skill using contextual situations, concrete materials, and pictorial representations to help students make sense of the mathematics. In the second stage the concept or skill is **reinforced** through unique games or activities. This stage provides the opportunity to assimilate and internalize the concepts and skills as it serves to connect the concrete and pictorial models of the introductory stage to the symbols of the practice stage.

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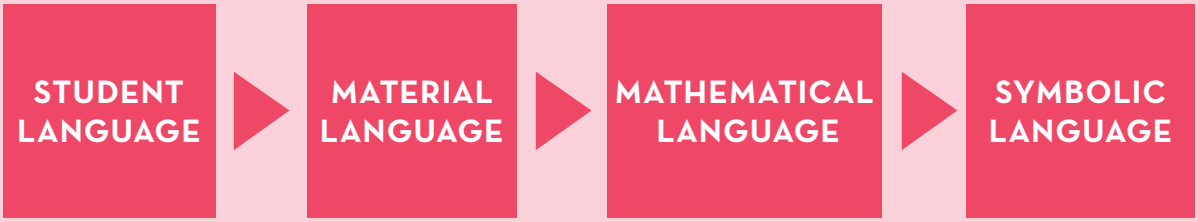
Once students are confident with the concept or skill they move to the third stage where visual models are no longer used. This stage develops accuracy and speed of recall. Written and oral activities are used to **practice** the skill to develop fluency. Finally as the name suggests, students **extend** their understanding of the concept or skill in the last stage.

For example, the "Use Tens" thinking strategy for multiplication can be extended beyond the number fact range, to include computation with greater whole numbers and eventually to decimal fractions.



LANGUAGE STAGES

ORIGO Stepping Stones also contains an appropriate developmental sequence for teaching the language associated with mathematical concepts. *Stepping Stones* was written on the premise that language is the tool that learners use to connect new ideas to existing ideas. Therefore, it is essential in helping students build an understanding of mathematical concepts. Young students need an understanding of mathematical concepts that involve more than just the symbolic notation that is used to record them.

In the first stage, children are encouraged to use their own natural language to describe the concepts. For example, students may use the words, "eat", "break", "jump away", "swim away", or "spend" to describe situations involving subtraction. Teachers should demonstrate this language and use real-world stories and illustrations to stimulate the use of this rich and meaningful language. This stage is aptly called the **Student Language** stage.

The students' language broadens as they begin to act out stories and problems using classroom resources. This **Material Language** stage includes language that is unique to the resources being used. For example, new language such as "cover up" or "take away" may be introduced when acting out subtraction stories with concrete, hands-on resources. Similarly, if pictures are being used, the students may say "cross out" or "erase" in the context of subtraction.

The third language stage refers to **Mathematical Language**. At this stage students begin to exhibit mathematical precision in their language. For example, in the context of subtraction, students will use the term "subtract" and eventually "minus." In reference to two-dimensional shapes they will start to say "vertex" to describe what they may have once called a "pointy corner." The language at this stage is often considered to be unique to mathematics.

In the final **Symbolic Language** stage, students are introduced to the symbols or notation of that concept. Therefore, with subtraction, they learn that the "minus" sign is an abbreviation for all the language of the previous stages. Students don't simply "move through" the stages. Rather, they begin by using their own natural language, then, as we act out those stories in the classroom, we add to their language and mental picture of the concept. Then we add more mathematical and finally symbolic language to build a bigger and more comprehensive understanding of the concept.