RENAISSANCE®

SPECIAL REPORT

The Renaissance® Mastery Model

What is mastery?

Mastery is defined as "knowledge and skill that allows you to do, use, or understand something very well" (Merriam-Webster.com, 2016).

In education, mastery is frequently associated with mastery learning, an approach popularized by psychologist Benjamin Bloom (1968, 1976) and colleagues, who had built on earlier ideas from those seeking an alternative to one-size-fits-all, lecture-centric classrooms (e.g., Washburne, 1922). The central tenet of mastery learning is that all students can learn if they are given good instruction and sufficient time. Mastery learning requires learning standards that are sequenced into clearly defined and meaningful skills as well as routine monitoring of student performance. The central beliefs underlying mastery learning are consistent with a number of popular evidence-based approaches, including competency-based education, understanding by design, personalized learning, and differentiated instruction.

Many studies show compelling positive benefits on outcomes such as student growth, motivation, and engagement when teachers implement mastery learning and similar approaches. For reviews and critiques of this literature, see Guskey and Gates (1986); Jensen (2006); Kulik, Kulik, and Bangert-Drowns (1990); Slavin (1987); and Slavin and Karweit (1984).

Although many schools use—or wish to use—mastery learning practices, they may lack efficient tools to fully implement them. One major hurdle to implementing mastery learning, or any personalized system, is the immense daily burden on teachers to track and manage all students and evaluate mastery of subskills/skills.

The Renaissance mastery model automates the tracking and reporting of student data from a wide variety of sources, and converts that data into a unified measure of mastery, helping teachers make timely and informed decisions about all students' learning.

The Renaissance mastery model automates the tracking and reporting of student data from a wide variety of sources, and converts that data into a unified measure of mastery, helping teachers make timely and informed decisions about all students' learning.

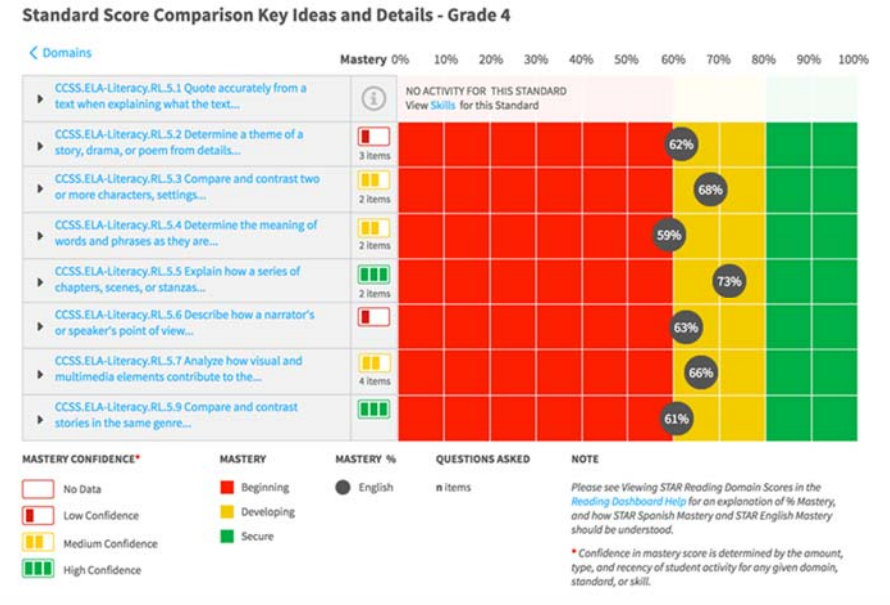
What constitutes mastery in Renaissance products?

It has been challenging (and may be impossible) to establish a definition for mastery that is consistent across all grades, subjects, and skills. By their nature, some skills are difficult to measure empirically. Therefore, as argued by Bloom (1968) as well as Guskey and Anderman (2014), an educator using professional judgment must ultimately determine whether a student has mastered a particular skill. Teachers constantly make these determinations as they evaluate and grade student work throughout the year. State and/or local standards often influence their decisions. The Renaissance mastery model's role is

to automatically aggregate available information about the student's performance on a particular subskill/skill in order to inform the teacher's decision making.

Because there is no universal definition of mastery for all subskills/skills in all situations, the Renaissance mastery model provides general guidelines for likely mastery (as seen in the figure): *Secure* mastery of a subskill/skill (when the calculated percent of mastery is 80% and higher), *Developing* mastery (60–79%), and *Beginning* mastery (59% and under). Depending on the task, the performance criteria an educator uses to verify mastery may be 100% or less than 80%—as noted, professional judgment informs this decision.

Example of Mastery View



Our 80% mastery threshold is generally consistent with expert guidance summarized by Ellis (2005); Guskey (2010); McDonald (2002); and Salvia, Ysseldyke, and Witmer (2017), which recommends levels of 80–95%. The 80%+ guideline was also informed by research that indicates this is the level where mastery status is likely maintained over several weeks following an original mastery determination. *Maintenance*—the ability to retain a skill or knowledge over an extended period of time—is important in mastery learning, mastery measurement, and related fields. For example, research on Renaissance Accelerated Math® that was reviewed by the National Center on Intensive Intervention in 2016 (under progress monitoring/mastery standards) demonstrated that mastery criteria of 80% was associated with very high levels of skill maintenance for several days or weeks after establishing initial mastery. Therefore, when our model indicates that a subskill/skill has been mastered at a secure level, we are predicting that the student would be able to maintain a high level of performance over a period of time.

How is mastery calculated?

Mastery is reported as a weighted and time-adjusted average percent correct, meaning the calculation uses weights to account for (1) differing types of assignments students engage in, and (2) recency of assignments completed. For example, quiz and test items are weighted more than practice items, and

newly completed items are weighted more than items completed earlier in the school year. The Renaissance mastery model provides three distinct views of mastery:

- **Assessed mastery** estimates mastery of domains and standards, based on results from general outcome measures such as the computer-adaptive Star Assessments™ and state summative tests.
- **Probed mastery** points to mastery of standards, skills, and subskills, based on targeted assignments from Renaissance Accelerated Reader 360®, Accelerated Math Instructional Practice, and Renaissance Star Custom®.
- **Comprehensive mastery** combines Assessed and Probed Mastery into a complete view, shows percent of mastery for domains, standards, skills, and subskills.

As mentioned, the Mastery View integrates data from various sources (Renaissance programs and assessments as well as state summative tests) into the mastery calculation. For students with Renaissance Star Early Literacy®, Renaissance Star Reading®, and/or Renaissance Star Math® computer-adaptive assessments as the sole source(s) of mastery information, skill mastery is derived from the placement of Star™ scores into the learning progressions (i.e., assessed mastery). However, when a student completes any assignment that directly examines mastery of particular skills or subskills (i.e., probed mastery), these items take priority in the comprehensive mastery calculation.

Depending on which Renaissance tools are in use, mastery information will update within minutes after a student completes any of the following: Star Reading; Star Reading Spanish; Star Early Literacy; Star Early Literacy Spanish; Star Math; Star Math Spanish; Star Custom; Accelerated Math Instructional Practice; Accelerated Reader 360 assignments when a skill is designated; imported state summative tests (PARCC, Smarter Balanced); and imported, external assignments when a skill/subskill is designated.

What is the confidence indicator, and how does it relate to a student's mastery score?

As shown in the figure on page 2, Renaissance provides a confidence indicator for each student's designated skill-mastery level (Secure, Developing, Beginning). Confidence is estimated using a statistical model and expressed as either high, medium, or low. Confidence captures the interplay between a student's consistency of performance and number of items completed, in addition to the weighted and time-adjusted factors that influence the mastery computation (see p. 2, *How is mastery calculated?*). This level also is impacted by the location of the student's current mastery score relative to the 60% and 80% minimum boundaries for Developing and Secure mastery. The farther this score is from those boundaries, the more likely high confidence becomes. High confidence signals a high degree of certainty that the reported Secure/Developing/Beginning classification accurately reflects a student's current mastery level. Low confidence indicates that assigning additional items for a skill/subskill may significantly change the reported mastery level.

References

Bloom, B. S. (1968). Learning for mastery. *Evaluation Comment, 1*(2), 1–5.

Bloom, B. S. (1976). *Human characteristics and school learning*, New York, NY: McGraw-Hill.

Ellis, A. K. (2005). *Research on educational innovations*. New York, NY: Routledge.

Guskey, T. R. (2010). Lessons of mastery learning. *Educational Leadership*, *68*(2), 52–57. Retrieved from http://www.ascd.org/publications/educational-leadership/oct10/vol68/num02/Lessons-of-Mastery-Learning.aspx

Guskey, T. R., & Anderman, E. M. (2014). In search of a useful definition of mastery. *Educational Leadership*, *71*(4), 18–23.

Guskey, T. R., & Gates, S. L. (1986). Synthesis of research on the effects of mastery learning in elementary and secondary classrooms. *Educational Leadership, 43*(8), 73–80. Retrieved from http://www.ascd.org/ASCD/pdf/journals/ed_lead/el_198605_guskey.pdf

Jensen, E. (2006). *Enriching the brain: How to maximize every learner's potential*. San Francisco, CA: Josey-Bass.

Kulik, C. C., Kulik, J. A., & Bangert-Drowns, R .L. (1990). Effectiveness of mastery learning programs: A meta-analysis. *Review of Educational Research, 60*(2), 265–299.

Mastery [Def. 1]. (n.d.). In *Merriam-Webster online.* Retrieved from http://www.merriam-webster.com/dictionary/mastery.

McDonald, M. (2002). *Systematic assessment of learning outcomes: Developing multiple-choice exams*. Sudbury, MA: Jones and Bartlett.

Priest, N., Rudenstine, A., Weisstein, E., & Gerwin, C. (2012). *Making mastery work: A close-up view of competency education*. Quincy, MA: Nellie Mae Education Foundation. Retrieved from http://www.competencyworks.org/resources/making-mastery-work/

Salvia, J., Ysseldyke, J., & Witmer, S. (2017). *Assessment in special and inclusive education* (13th ed.). Boston, MA: Cengage Learning.

Slavin, R. E. (1987). Mastery learning reconsidered. *Review of Educational Research, 57*(2), 175–213.

Slavin, R. E., & Karweit, N. L. (1984). Mastery learning and student teams: A factorial experiment in urban general mathematics classes. *American Educational Research Journal, 21*(4), 725–736.

U.S. Department of Education: National Center on Intensive Intervention. (2016). *Review of progress monitoring tools* [Review of Accelerated Math]. Washington, DC: Author. Retrieved from http://www.intensiveintervention.org/progress-monitoring-mm/accelerated-math-math-3#passfail

Washburne, C. W. (1922). Educational measurements as a key to individual instruction and promotions. *Journal of Educational Research, 5*(3), 195–206.