



Foundation Paper

Supporting Special Education Students with *FASTT Math*

FASTT Math is an intervention program, in English and Spanish, designed to support students in second grade and up in establishing fluency with basic math facts from numbers 0-9 or 0-12. With interactive software, comprehensive teacher resources, and individualized practice sheets, students gain automatic recall of basic addition, subtraction, multiplication, and division facts, allowing them to free up critical mental resources so that they can focus on higher-order math. With the research-validated *FASTT* system—Fluency and Automaticity through Systematic Teaching with Technology—computer-based instruction is automatically differentiated in customized daily sessions based on continuous assessments of students' fluency.


OVERVIEW OF THE *FASTT Math* Program

FASTT Math uses research-validated methods to provide systematic instruction and continuous practice to help students automatically recall and understand math facts in addition, subtraction, multiplication, and division. The program uses adaptive technology to offer each student a differentiated learning experience based on his or her individual strengths and weaknesses. Developing fluent recall of the basic math facts allows teachers and students to focus on more complex computations, problem-solving and higher-order math concepts in the math curriculum.

RESEARCH FOUNDATION

Dr. Ted Hasselbring, professor in the Department of Special Education at the Peabody College of Vanderbilt University and former William T. Bryan Professor and Endowed Chair in Special Education Technology at the University of Kentucky and Laura Goin, Chief Executive Officer of Designs for Learning, developed *FASTT Math* for students in need of assistance with developing fact fluency, based on two decades of research. Dr. Hasselbring has an extensive background designing technology programs aimed at helping students with learning disabilities and students identified as at-risk.

FASTT Math employs a proven approach called “expanding recall” to help students move newly acquired math facts from their short-term working to their long-term memory. Placement and diagnostic assessments, adaptive instruction, independent practice, continuous progress monitoring, and actionable reports work together to meet each learner precisely where he or she is. For students who lack a conceptual understanding of the operations, the program offers additional lessons and activities that focus on the mathematical foundations they need before developing fluency.

 The *Research Foundation & Evidence of Effectiveness for FASTT Math* provides specific information regarding the research foundation for the program. Please contact your Scholastic Account Executive to request a copy.

UNIVERSAL DESIGN FOR LEARNING (UDL)

The Center for Applied Special Technology (CAST) has defined three facets of content to support the Universal Design Principles for Learning (UDL). *FASTT Math* addresses each:

1. *Multiple Means of Representation*, to provide students a variety of ways to learn.

FASTT Math helps students become fluent in addition, subtraction, multiplication, and division facts. The program teaches math facts in new ways using abstract methods such as ten frames or visual arrays. In these visual representations *FASTT Math* breaks down the fact. In addition to seeing the fact, students hear the fact and say the fact. Then, students are required to type out the entire fact sentence which helps them to further build a memory connection to the fact.

2. *Multiple Means of Expression*, to offer students alternatives to show what they know.

In *FASTT Math*, Students experience multiple opportunities to practice retrieval of math facts and show what they have learned. Several engaging games that become increasingly challenging as students improve provide a platform for improving speed and accuracy with facts they have already learned. In addition, Independent Practice sheets provide students with the opportunity to transfer learning from the computer to pencil and paper. These worksheets are customized to draw on students' current fact fluency and can incorporate multi-digit and multi-operation computations.

3. *Multiple Means of Engagement*, to motivate and challenge students appropriately.

The *FASTT Math* student software has several built-in features to motivate students and recognize their progress. As students gain fluency with new facts, the program adds more choices for customizing the interface of their "Fast Tracker" device. The program divides the facts in the fact grid into levels. When a student achieves a new level in the student software, the *Scholastic Achievement Manager* notifies the teacher so he/she can print an award certificate to celebrate the student's success. Finally, when students learn new facts or play a game, they are rewarded with points, displayed at the end of the activity or game. Each lesson represents an opportunity to beat their own best score.

EXPLICIT, SCAFFOLDED INSTRUCTION

FASTT Math employs a proven approach called "expanding recall" to help students move newly acquired math facts from short-term working to long-term memory. No more than three new facts are introduced during any given 10-minute session. Students practice holding new facts longer and longer in working memory until they make the leap to automatic retrieval. Developing automatic recall of basic facts provides the foundation needed for later development of higher-order math skills.

FASTT Math uses this effective procedure:

- a. The student is introduced to two or three non-fluent facts to study. Typically, but only when possible, the session's "Study Facts" appear as a commutative pair. The student is encouraged to read the facts aloud. The student can also watch an animated representation of each fact to help remind him/her in a more concrete way of what the fact represents.
- b. After seeing and speaking the new "Study Facts," the student is asked to type each number sentence into the computer. If he/she types the facts incorrectly, the facts are redisplayed, and the process is repeated. This helps establish a memory relationship with the fact in the student's mind.
- c. Once the student can correctly type the number sentences of the new "Study Facts," the program then presents a practice session with these facts. The program mixes presentations of the two "Study Facts" with a gradually increasing number of fluent facts. The student builds the capacity to hold the fact in memory for a longer and longer period of time. *FASTT Math* limits the allowed response time to prevent the student from employing non-automated strategies.
- d. When the student is able to recall the current "Study Facts" consistently, the facts are added as "Focus Facts" to the student's Fact Grid. The software provides extra practice to help the students solidify them in memory and increases recall speed.
- e. Once a student is able to recall his or her "Focus Facts" in less than .8 of a second, those "Focus Facts" are changed to "Fast Facts" on the student's Fact Grid.

FASTT Math also provides students with customized worksheets to practice their math facts in a paper-and-pencil format. Teachers can print problems in a vertical or horizontal format and in single- and multi-digit operations. These worksheets only include the math facts with which a student is fluent or is currently studying.

ASSESSMENT

FASTT Math includes several periodic assessments that check student progress continuously and adjust instruction accordingly.

- Mastery Assessments determine if a student has developed fluency with the group of math facts presented in the software. Students participate in these assessments depending on how many facts they need to master, and how much time they have spent on the software and the lessons they have completed. After every 60 minutes of instructional time spent on the software, this tool determines which Focus Facts students can retrieve in .8 of a second or less.
- Challenge Assessments show whether the student is able to respond fluently to facts that will be presented in the next level. Students may have been tested on these same facts in the Placement Assessment. The Challenge Assessments account for what the student may have learned and the fact fluency they may have gained outside of using the software.
- The Special Challenge Assessment is presented when a student moves from the 0-9 to the 0-12 number range within the same operation. The purpose is to evaluate fluency of newly assigned fact in the 10s, 11s, and 12s.

Through the *Scholastic Achievement Manager* (SAM) teachers and administrators can generate reports on individual students, groups of students, an entire class, a grade, the whole school, or district. Reports provide information on a variety of performance measures, including fact fluency status, progress, and response to intervention, among others. In addition, SAM will alert teachers when it identifies a problem, like low usage or slow progress, or when there is reason to celebrate, like achievement of a new level in fact fluency.

PROGRESS MONITORING

Actively monitoring student progress and program usage is easy with the help of three different types of reports for *FASTT Math*. These reports help teachers to assess a student's strengths and weaknesses and evaluate his or her progress in math fact fluency. Further reports inform instruction and facilitate administrative and management tasks.

- Student Reports can be printed by teachers and administrators for individual students. The Student Fact Fluency Status Report shows an individual student's fluency with each fact in the specific operation for the selected date. The Student Lesson Status Report shows individual student daily lesson status during the selected time period. The Student Response to Intervention Report shows individual student fact fluency growth over time.
- Class, Grade, and Teacher Reports can be printed by teachers and administrators for specific groups, classes, and for all students that are assigned to a teacher. The Progress Report shows student performance—such as Fast Facts after Placement Assessment and current Fast, Focus, and Study Facts—and usage information for each student listed. The Intervention Grouping Report groups students under four *FASTT Math* performance standards—Fluent, Near Fluent, Developing, and Underdeveloping.
- School and District Reports can be printed by administrators for specific grades, schools, and a district. The Summary Progress Report shows the number of students enrolled in *FASTT Math* and assigned to each operation. The *FASTT Math* Implementation Report shows student fact fluency growth during the selected time period.

MOTIVATION & ENGAGEMENT

The *FASTT Math* student software leads the student through a linear path of instruction and assessment. As part of the daily lesson, the student will be given a customized assignment; for example, to study new facts. In addition, the student will be required to complete one practice game per day; the practice game focuses only on learned facts. Each lesson should take about ten minutes to complete. *FASTT Math* has nine engaging practice games of two different types, as follows:

1. Game Type One: Five objects move continuously from one end of the screen to the other. Each object is linked to a math fact. The goal of the game is to answer each fact as fast as possible to keep the objects from reaching the other end of the screen. Correct responses are awarded points.
2. Game Type Two: Three facts are linked to one object moving from one end of the screen to the other. The faster the student answers each fact the faster the object moves. Correct responses are awarded points and bonus points.

When students are learning new facts or playing a game in *FASTT Math*, they are rewarded with points. Students feel a deep sense of accomplishment as they master math facts and watch them recorded on the *FASTT Math Fact Grid*. Students compete with their own previous scores, which focuses them on progressive self-improvement. When a student reaches a new level in the software, the *FASTT Math Manager* notifies the teacher, who can print an award certificate.

PROFESSIONAL DEVELOPMENT

Scholastic will provide a half-day in-person implementation training for teachers. This training examines how *FASTT Math* teaches automaticity and fluency and provides teachers with all the tools to successfully get started with the program. Participants learn how to implement the *FASTT Math* instructional model, use report data to monitor progress and individualize instruction, and integrate *FASTT Math* into the existing mathematics curriculum. Supplemental full-day trainings, as well as coaching days are available for an additional cost.

The *FASTT Math* program also includes a wealth of professional development materials with the purchase of the program. The *FASTT Math Teacher's Guide* provides strategies for effectively implementing the program and using software-generated reports to monitor and manage student progress. The *Fact Fluency Foundations Guide* offers concrete guidelines and resources for assessing and addressing student's needs in understanding number sense and operations. The *Research Foundation & Evidence of Effectiveness for FASTT Math* presents the research-based principles behind the program and data that shows how effective *FASTT Math* is in increasing math fact fluency.