

## Intervention Taxonomy Brief: Hot Math Tutoring

The goal of this brief is to provide educators with information they can use to evaluate the appropriateness of **Hot Math Tutoring** for a specific student or group of students who require supplemental and intensive intervention. The brief also may be used to guide decisions about the selection or purchase of a new intervention. We envision that the brief may allow users to examine the extent to which the program aligns to the Taxonomy of Intervention Intensity, a framework used by educators to categorize interventions along key dimensions. The information included in this brief is organized along the seven dimensions of the Taxonomy of Intervention Intensity and can assist educators in answering the following questions:

- Does evidence suggest that this intervention is expected to lead to improved outcomes in the identified area of need (**strength**)?
- Will the group size, duration, structure, and frequency provide sufficient opportunities for students to respond and receive corrective feedback (**dosage**)?
- Does the intervention match the student’s identified needs (**alignment**)?
- Does the intervention assist the student in generalizing target skills to general education or other tasks (**attention to transfer**)?
- Does the intervention include elements of explicit instruction (**comprehensiveness**)?
- Does the student have opportunities to develop the behavior skills necessary to be successful (**behavioral support**)?
- Can the intervention be individualized with a data-based process to meet student needs (**individualization**)?

To learn more about the Taxonomy of Intervention Intensity and find resources to support implementation, visit <https://intensiveintervention.org/taxonomy-intervention-intensity>.

## Program Summary

Hot Math Tutoring is a systematic structured tutoring program for building word-problem solving skills at third grade. With Hot Math, students learn to identify the underlying conceptual framework and learn a solution strategy for four types of word problems taught at third grade:

- “Shopping list” problems (e.g., Joe needs supplies for the science project. He needs two batteries, three wires, and one board. Batteries cost \$4 each, wires cost \$2 each, and boards cost \$6 each. How much money does he need to buy the needed supplies?)
- “Half” problems (e.g., Marcy will buy 14 baseball cards. She’ll give her brother half the cards. How many cards will Marcy have?)
- Step-up function or “buying bags” problems (e.g., Jose needs 32 party hats for his party. Party hats come in bags of four. How many bags of party hats does Jose need?)
- Two-step “pictograph” problems (e.g., Mary keeps track of the number of chores she does on this chart [pictograph is shown with label: each picture stands for three chores]. She also took her grandmother to the market three times last week. How many chores has Mary done?)

## Exhibit 1. Program Information

Features of program implementation	Program recommendations
Grade level(s)	3
Group size	1–4
Intervention length	36 lessons
Frequency	Three times per week
Session duration	20–30 minutes
Cost	One manual and a supplemental student materials packet (\$69; sold as a paper copy, a USB drive, or a CD)
Training	For information on professional development opportunities and costs, contact <a href="mailto:lynn.a.davies@vanderbilt.edu">lynn.a.davies@vanderbilt.edu</a> .

## Evidence of Taxonomy of Intervention Intensity Dimensions

The following section presents definitions for the Taxonomy of Intervention Intensity dimensions and a summary of intervention-specific evidence for each dimension. The evidence comes from the intervention’s vendor or developer. It is accurate as reported to the National Center on Intensive Intervention (NCII); it was not independently verified by NCII. Additional program evidence can be found on the [NCII Tools Chart](#) and might appear on the [What Works Clearinghouse](#). For specific questions about the content, contact the publisher at [lynn.a.davies@vanderbilt.edu](mailto:lynn.a.davies@vanderbilt.edu) or visit [https://frg.vkcsites.org/what-are-interventions/math\\_intervention\\_manuals/](https://frg.vkcsites.org/what-are-interventions/math_intervention_manuals/).

### Taxonomy Dimension: Strength

*Strength tells us how well the program works for students with intensive intervention needs, expressed in terms of effect sizes. Effect sizes greater than 0.25 indicate an intervention has value in improving outcomes. Effect sizes of 0.35 to 0.40 are moderate, and effect sizes of 0.50 or larger are strong (preferred).*

Exhibit 2 provides the effect sizes for students in need of intensive intervention organized by domain and subdomain. These effect size data are calculated on low-achieving participants, those falling at or below the 20th percentile on pretest measures of achievement. If available, additional effect sizes for disaggregated data can be found on the NCII Tools Chart.

**Exhibit 2. Hot Math Tutoring Effect Sizes for Students ≤20th Percentile by Domain and Subdomain**

Domain	Subdomain	Outcome measures	Effect size <sup>a</sup>
Mathematics	Math Concepts	Immediate Transfer	1.43*
Mathematics	Math Concepts	Near Transfer	0.96*
Mathematics	Math Concepts	Far Transfer	0.49

<sup>a</sup> To ensure comparability of effect size across studies, NCII uses a standard formula to calculate effect sizes across all studies and outcome measures—Hedges *g*, corrected for small-sample bias.

\**p* ≤ 05.

**Taxonomy Dimension: Dosage**

*Dosage is the number of opportunities a student has to respond or practice and receive corrective feedback. Dosage may be impacted by the size of the instructional group, the number of minutes each session lasts, the number of student-teacher interactions built into lessons, and the number of sessions provided per week.*

Assuming a group size of four students, each student in the group has an estimated 93.75 opportunities to respond and receive corrective feedback.

**Taxonomy Dimension: Alignment**

*Alignment (Exhibit 3) focuses on how well the program (a) addresses the target student’s full set of academic skill deficits, (b) does not address skills the target student has already mastered (extraneous skills for that student), and (c) incorporates a meaningful focus on grade-appropriate curricular standards.*

**Exhibit 3. Alignment With Content Areas Addressed**

Instructional grade level(s)	Content area addressed	Skill strands
Grade 3	Mathematics	Word problem solving

**Taxonomy Dimension: Teaching to Promote Transfer**

*Attention to transfer is the extent to which an intervention is designed to help students (a) transfer the skills they learn to other formats and contexts and (b) realize connections between mastered and related skills.*

A major instructional focus within Hot Math is explicitly teaching for transfer: broadening students’ understanding of problem types to teach for transfer. Tutors teach the meaning of the word “transfer” and then teach students about the four transfer features that change a problem without altering its type or solution strategy. These four features involve using unfamiliar vocabulary, posing an additional question, incorporating irrelevant information, and combining

problem types into multistep problems. Tutors explain each superficial feature with worked examples. They gradually move to partially worked examples and then with students completing ! problems independently while tutors provide corrective input and feedback.

**Activity 1: Word-Problem Explicit Instruction.** Focuses on word-problem features that make ! problems seem unfamiliar but do not alter the solution strategy for the taught word-problem type. For example, activities include worked examples to help students understand how word problems can seem unfamiliar but still fall within a taught word-problem type. !

### **Taxonomy Dimension: Comprehensiveness**

*Comprehensiveness is the number of explicit instruction principles the intervention incorporates (e.g., providing explanations in simple, direct language; modeling efficient solution strategies instead of expecting students to discover strategies on their own; providing practice so that students use the strategies to generate many correct responses; and incorporating systematic cumulative review). Additional information can be found within the NCII [Explicit Instruction course content materials](#).*

#### ***Dimension: Provide Explanations in Direct, Simple Language***

**Activity 1.** Each lesson is scripted to provide tutors direct, simple language within the program’s explanations. Tutors review and practice scripted explanations. They do not read or memorize scripts.

**Activity 2:** Throughout the program, students receive corresponding practice using direct and simple language to explain solution strategies.

#### ***Dimension: Model Efficient Solution Strategies***

**Activity 1.** Throughout the program, each time a new problem type is introduced, the tutor models the program’s efficient solution strategy for solving that problem type. The manual thoroughly describes each problem type and its solution strategy. Problem types address word problems and the calculation solutions needed to solve word problems.

**Activity 2.** Throughout the program, students receive ongoing practice applying the taught strategies as the problem types gradually increase in complexity.

#### ***Dimension: Ensure That Students Have the Necessary Background Knowledge and Skills to Succeed***

The program is designed systematically so that the prerequisite skills are taught within an introductory unit. This unit covers the following introductory skills involving general math problem-solving strategies: making sure answers make sense; lining up numbers from text to perform mathematical operations; checking computation; and labeling work with words, monetary signs, and mathematical symbols. These lessons follow the same comprehensive instructional design dimensions as outlined in this section.

#### ***Dimension: Incorporate Systematic Review, With Problem Sets That Mix Problem Types (Interleaved Practice)***

**Activity 1.** The program is designed systematically so that each session provides students with supervised independent practice that cumulatively reviews previously taught problem types while mixing problem types across problem sheets. This helps build student skill in

distinguishing among problem types and supports the retention of previously taught material. Independent practice is timed.

**Activity 2.** Within each independent practice problem set, tutors provide corrective feedback to repair misconceptions and errors in solution strategies.

**Taxonomy Dimension: Behavioral Support**

*Behavioral support addresses the extent to which the program incorporates (a) self-regulation and executive function components and (b) behavioral principles to minimize undesired behavior.*

*Additional information can be found within the [NCII behavioral support course content](#).*

**Activity 1.** *Hot Math's* self-regulated learning strategies incorporate the following components. First, tutors remind students to stay “on-task” by working hard, listening carefully, and following directions. Tutors set timers for three irregular intervals throughout the session; when the timer sounds, each student earns a point if all students in the group are on task. If any student is off task, no student receives a point. Second, students receive up to three points per session for accurate work, with the task for which accuracy is rewarded varied across sessions. Third, students complete one problem, called the Hot Math Problem of the Day. This problem is scored on a 20-point scale by tutors according to a specific rubric; students are encouraged to participate in the scoring and to meet or beat their previous day’s score. Fourth, following the Hot Math Problem of the Day, students shade their Hot Math thermometers with the number of points they earned during the session. Fifth, students use their Hot Math thermometers to set a goal for next day. Sixth, students are awarded stickers for each point. At the end of each session, students total their points and note their totals on a game board. Students earn “dollars,” which they can spend at the Hot Math Store.

**Activity 2.** Interweaved throughout the program is growth mindset instruction to help students understand that they can improve performance when they work hard.