

Building Math Fact Fluency:

A Model Teaching App for K-12 Teachers

Read the Full Article Here:

<https://www.modelteaching.com/education-articles/math-instruction/building-math-fact-fluency>

Introduction

Imagine a second-grade teacher pulling a small group of students during her math block and reinforcing concepts from a two-digit addition lesson. She notices several students counting on their fingers to solve single-digit sums as they work on their math problems. She realizes that the work is taking them a bit longer than they should, and by the time they reach the step where they have to regroup in their two-digit addition problems, the students make careless addition mistakes. As a result, the work that students need to complete takes longer than it should.

She quickly notices that her students lack automaticity (the ability to quickly recall their math facts). They are also not demonstrating fluency (the ability to solve problems accurately and within a reasonable time frame). She recognizes what many math teachers immediately recognize as well- that her students require more practice. So she begins to plan math drills every day for her students until automaticity and fluency improve.

Why fluency and automaticity are important

Procedural fluency is described as one of the five strands of mathematical proficiency (<https://www.nationalacademies.org/read/9822/chapter/6>), and the skill is defined as the “skill in carrying out procedures flexibly, accurately, efficiently, and appropriately”. Within procedural fluency, automatic recall, or automaticity, of basic facts plays an important role in students being considered fluent in mathematical skills. Math fluency progresses through three phases:

1. Phase 1 is the counting phase, where students have to actually count, for example, to add numbers.
2. Phase 2 is the reasoning strategy phase, where students will reason their way through a problem, for example, knowing that 9 plus 1 is 10, therefore 9 plus 2 is just one additional, or 11.

3. Phase 3 is mastery, where students can accurately and automatically produce answers without counting or reasoning.

(<https://justaskpublications.com/just-ask-resource-center/e-newsletters/msca/math-fact-fluency/>)

What Kinds of Math Practice are Important for Fluency?

Students cannot jump from counting to mastery; they still need to master the reasoning phase to become fully fluent in math facts. What this means is that students need to develop number sense and an understanding of how to add, subtract, multiply, or divide numbers; after that, recall and practice of math facts can be incorporated to help students move towards mastery.

Conceptual understanding of math is the first focus for helping your students master math facts. Many organizations recommend that fluency building follow explicit conceptual instruction and practice (<https://stemtc.scimathmn.org/build-procedural-fluency-conceptual-understanding>).

After the explicit instruction where students are practicing concepts and reasoning through problems, they can then move into retrieval practice, the strategy of actively recalling information again and again, as well as spaced repetition, the strategy of completing short, frequent practice sessions over a long period of time

(<https://www.edutopia.org/article/incorporate-spaced-learning-lesson-plans/>).

Finally, students need to receive immediate and specific feedback to ensure learning sticks and that their practice is accurate and moving them toward automaticity and fluency.

(<https://growbeyondgrades.org/blog/immediate-feedback>). Taken together, strong math practice looks like:

- Explicit instruction focused on conceptual understanding of math facts
- Retrieval practice and spaced repetition to strengthen math fact mastery
- Immediate feedback to correct mistakes and misconceptions and reinforce correct understanding

Explicit Instruction

Explicit instruction by a classroom teacher is considered an incredibly effective way for students to learn new content (<https://www.readingrockets.org/topics/curriculum-and->

[instruction/articles/16-elements-explicit-instruction](#)) . Explicit instruction requires teacher modeling of how to complete a procedure or problem, grouped work, where all students, along with their teacher, work together to complete the procedure, and then independent practice specific to each student. By combining instruction to promote conceptual understanding of math facts with additional tools and resources to support retrieval practice and math fact mastery, students have a clear path to true procedural math fluency. This is where math practice apps come in!

The Model Teaching Math Facts App

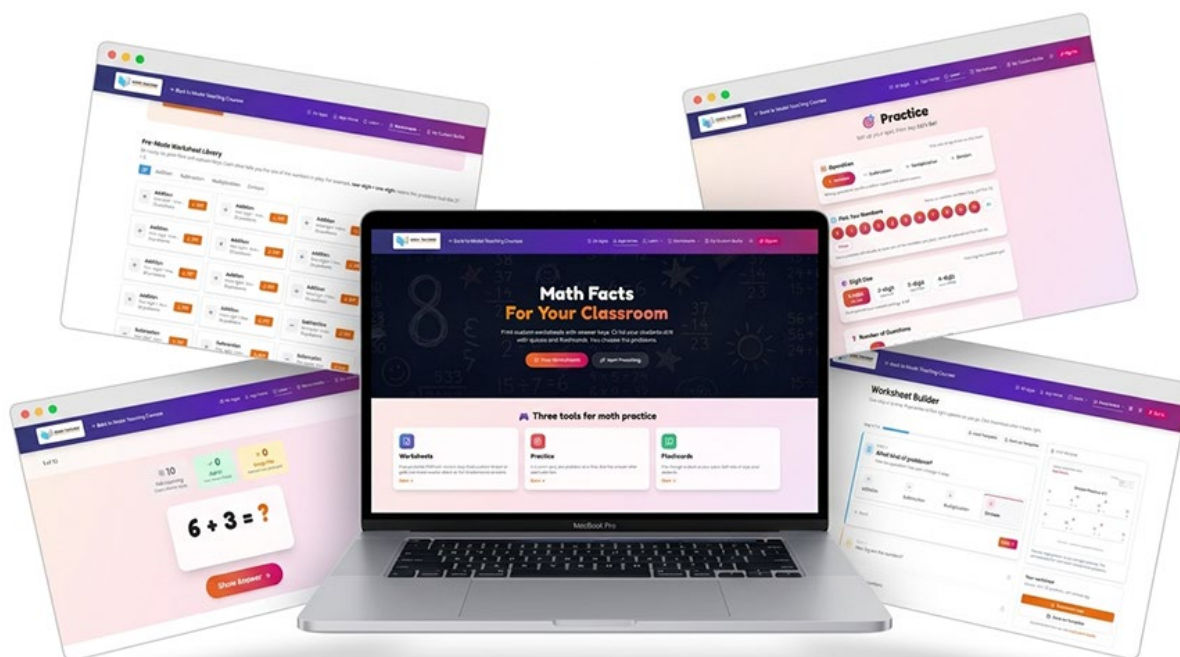
The Model Teaching Math Facts App was designed around the research principles mentioned above. Designed to be used after explicit instruction and after conceptual understanding practice, it allows a simple and easy-to-use method of practicing math facts applications covering addition, subtraction, multiplication, and division. It does nothing else, so it is targeted to improve math fluency in students. It is also highly customizable, allowing students to practice exactly the concepts and even the exact numbers that they need to work on. It contains several modes, all able to be customized based on the operation and numbers you wish for students to practice:

Quiz Mode: One problem at a time, with immediate feedback. This supports retrieval practice and immediate feedback to students so that they can see the correct answer immediately before moving on.

Flashcards: Flashcards are one of the most studied retrieval practice formats and support long-term retention of math skills.

Workbooks: Fully customizable, printable worksheets with answer keys provide a low-tech option for practice, which is important for students to limit their interactions with digital products, especially at a young age.

Incredibly simple and focused, the Model Teaching Math Facts App does one thing well: allow students to move toward math fluency mastery in an easy-to-use and fully customizable app. Custom number ranges and operation selection allow teachers and parents to target specific tasks, and will allow complete differentiation for students.



How the Model Teaching Math Facts App Compares to Other Practice Tools

There are many math apps available to both teachers and students, and they offer a variety of functions! Some math apps are comprehensive, focusing on content across the entire student's grade level, while other math apps offer a narrow and thorough dive into a particular concept. Math facts apps generally fall into two categories. The first is the gamified app, which incorporates math practice with characters, stories, rewards, or animations. The second is apps focused more on school accounts, which require teachers to create accounts, roster students, assign PINs, or track student usage through a teacher dashboard. Both types of apps have their place in the classroom, depending on the teacher, parent, or students' needs! But these kinds of apps aren't always the best choice for all students. Gamified apps could potentially slow down practice and redirect students' attention to the visual stimuli of the game, or shift students' attention to the features of the game and not necessarily the math itself. Account-based apps could require additional setup time or include additional cumbersome features that a teacher may not always need. The Model teaching Math Facts App is designed for a specific purpose: to allow students to practice addition, subtraction, multiplication, and division math facts in varied ways as they work toward math fluency and mastery. It removes any additional "fluff" or steps, focusing solely on math skills for mastery. If a student or teacher is looking for a

specific solution to a classroom problem, our app can provide it. The Model Teaching Math Facts app requires no account and stores no student data. A teacher, parent, or student can open the app and get started immediately. It is fully customizable for the exact operations and numbers a teacher may wish for students to practice. And, most interestingly, it pairs digital practice with customizable and printable worksheets, which is uncommon among free math facts apps.

Considerations and Model Teaching Recommendations

The Model Teaching Math Facts App, like all Model Teaching Apps, is designed as a supplement, not a substitute, to instruction. You can teach operations conceptually before students begin retrieval practice, so that students understand what each operation represents before they begin mastering facts. Explicit instruction in strategies by the classroom teacher is important when students are introduced to new concepts. When a teacher feels students are ready for practice, introduce the Model teaching Math Facts App. But keep sessions short! Research, especially for elementary students, supports brief, focused practice over longer drill sessions. In addition, mindful use of digital technology is an important component of effective teaching and can enhance learning, but not become a focus of how students interact with math concepts. Five to ten minutes of daily practice on the app is sufficient. Finally, pair any digital practice with pencil-and-paper instruction using the worksheet builder feature. Then, pair that independent practice work with additional classroom discussion or other group math activities to allow for varied interaction of math facts within your classroom. You can even recommend the app to your students' parents, with guidance on how they can practice their math facts digitally or by completing worksheets at home.

Getting Started

The Model Teaching Math Facts App is available at:

<https://apps.modelteaching.com/mathfacts> . No account is required to begin using it.

You can use it in three ways:

- ✓ Worksheets
- ✓ Practice mode
- ✓ Flashcards

Simply choose your operation, set your number ranges, and create your practice! It's ready to use within 30 seconds, so you have a ready-to-go tool your students can use immediately.

References

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About the Model Teaching Apps Suite

Model Teaching's apps are focused digital tools designed to reinforce the great instruction that is already happening in your classroom. We at Model Teaching are pro-instruction and know that the best learning will come from a child's teacher and their parents. Our apps exist to reinforce that instruction with focused practice or targeted instructional support, not to substitute for it. Our apps are built to support teachers in their planning and students in their practice, designed around what research tells us actually works in the classroom. Our position on AI and digital tools is straightforward: they should improve thinking, not replace it. Every Model Teaching app is built with that standard in mind. To explore the full suite, visit apps.modelteaching.com.