



5 Evidence-Based Recommendations for Teaching Math to Young Children



Children have a natural interest in math, and the *Teaching Math to Young Children* practice guide aims to help teachers capitalize on that interest to make children's preschool and school experience more engaging and beneficial.

In this practice guide summary, you will find:

- An overview of the guide's five practical, evidence-based recommendations
- Examples of innovative tools and strategies teachers can use in their classrooms
- A brief discussion of the evidence that supports the guide's recommendations

By the Numbers

The *Teaching Math to Young Children* practice guide was developed by a panel of nationally recognized experts in early childhood education. It contains five practical, evidence-based recommendations for educators to use to teach math in their classrooms. This By the Numbers overview highlights the wide variety of useful features teachers will find in the guide. We begin with a summary of the panel's recommendations and action steps, followed by a discussion of the systematic review of the evidence that forms the basis of the guide. We conclude with a selection of examples, figures, tables, and other features teachers can put to use in their classrooms right away. When these resources are added up they sum to an invaluable resource for teaching math to young children

5

clear recommendations for teaching math to 3–5 year olds.

13

solutions to common roadblocks teachers may encounter when teaching math to young children.

21

specific action steps for implementing the guide's recommendations.

29

studies that met rigorous WWC evidence standard to craft the recommendations of this guide.

11

helpful examples of classroom activities and games for helping children practice math.

154

references cited to support the recommendations in the guide.

7

figures to illustrate concepts and ideas discussed in the practice guide.

28

terms defined in the glossary for teachers to reference.

10

tables that organize information for teachers to use during lesson planning.

Recommendations & Action Steps

The *Teaching Math to Young Children* practice guide is organized around five main recommendations, each supported by a set of clear, action-oriented steps teachers can use in their classrooms.

Recommendation 1: Teach number and operations using a developmental progression.

- ✓ Provide children with opportunities to subitize small collections, practice counting, compare the magnitude of collections, and use numerals to quantify collections before moving on to simple arithmetic problems.

Recommendation 2: Teach geometry, patterns, measurement, and data analysis using a developmental progression.

- ✓ Teach children to recognize and compare shapes, identify and create patterns, make direct comparisons using measurement tools, and collect and organize information.

Recommendation 3: Use progress monitoring to ensure that math instruction builds on what each child knows.

- ✓ Determine children's current level of math knowledge based on a developmental progression, and then use the information about children's skills to tailor instruction.

Recommendation 4: Teach children to view and describe their world mathematically.

- ✓ Use informal methods to represent math concepts generally before linking those concepts to specific formal math vocabulary and symbols. Open-ended questions and math conversation can encourage children to practice applying their math knowledge in everyday situations.

Recommendation 5: Dedicate time each day to teaching math, and integrate math instruction throughout the school day.

- ✓ Deliberately set aside time each day to teach math and look for opportunities to incorporate math across the curriculum.

Evidence

Teachers face a host of decisions every day about what materials to use, what activities to select, and what tools to employ that are most effective for helping their students learn math. WWC practice guides help teachers make those decisions by providing expert recommendations based on current education research. A panel of experts systematically reviewed over 2,300 studies related to teaching math to young children, and identified 29 studies that meet WWC evidence standards. The highlights of those studies are summarized below.

The panel followed WWC guidelines to determine the strength of the evidence to support each recommendation.

- **Strong:** A “strong” evidence rating is assigned to recommendations that contain a large body of rigorous evidence that isolates the practice and demonstrates it has consistent and positive impacts in typical settings.
- **Moderate:** A rating of “moderate” is assigned when there is evidence to suggest the practice is effective, but there is an indication that the practice may not be effective in every setting or by itself.
- **Minimal:** In some cases the panel makes recommendations that are not backed by a body of rigorous evidence, either because more research is necessary in this area or because there are problems with the research base. In these cases

the panel relies on their expert knowledge and support from less rigorous studies to assign a rating of “minimal” to the recommendation.

The panel determined that most recommendations are supported by a minimal level of evidence. Although many studies supported each recommendation, few studies examined the effectiveness of the practices in isolation, several studies evaluated interventions that contained multiple practices, and many studies did not provide sufficient information on the instruction received by the comparison group. The evidence rating for each recommendation is presented below. For more details on the specific studies that contribute to the evidence ratings, please see Appendix D of the practice guide.

Recommendation	Levels of Evidence		
	Strong Evidence	Moderate Evidence	Minimal Evidence
1. Teach number and operations using a developmental progression.		◆	
2. Teach geometry, patterns, measurement, and data analysis using a developmental progression.			◆
3. Use progress monitoring to ensure that math instruction builds on what each child knows.			◆
4. Teach children to view and describe their world mathematically.			◆
5. Dedicate time each day to teaching math, and integrate math instruction throughout the school day.			◆

Examples & Roadblocks

Throughout the guide, teachers will find examples of classroom activities and games that can supplement their lesson plans and provide opportunities for children to learn math.

Example: The *Concentration: Numeral and Dots* game

Objective: Match numerals with corresponding quantities.

Materials needed: One set of twenty cards: ten cards with numerals from 1 to 10 along with the corresponding number of dots, and ten cards with pictures of objects (the numbers of objects corresponding to a numeral 1–10). For even more advanced play, once children are proficient at numerals 1–10, teachers can create cards for numerals 11–20.

Directions: Half of the cards have a numeral and dots to represent the amount (e.g., the numeral 3 and three dots) on one side, and the other half have pictures of collections of objects on one side (e.g., three horses, four ducks). The other side of each card is blank. The cards are placed face down, with the numeral cards in one area and the picture cards in another. A player chooses one numeral card and one picture card. If they match, then the player keeps those cards. Play continues until no further matching cards remain. The player with the most cards wins the game.

Early math content areas covered:

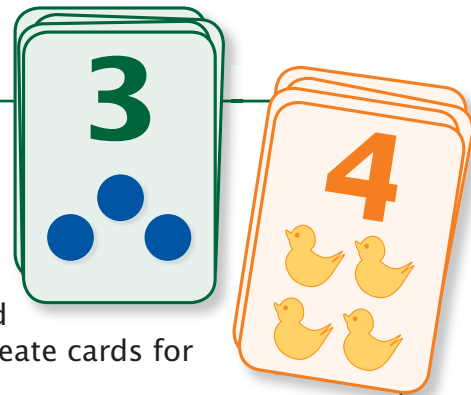
- Numeral recognition.
- Corresponding quantity.
- If the objects in the pictures on the cards are in different orders, it can help reinforce the idea that appearance does not matter when it comes to number.

Monitoring children's progress and tailoring the activity appropriately:

- Play the game with a small group of children, noting each child's progress in practicing and achieving the objectives.
- This game can be played with children who are not familiar with numeracy concepts. Use fewer cards, lower numbers, or cards with dots to scaffold. As children gain proficiency with the concepts, increase the number of cards and the size of the numbers.

Using the activity to increase math talk in the classroom:

- Before asking, "How many?" ask, "How can we find out how many?"



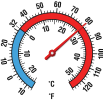




In addition to these helpful examples, the practice guide also includes concrete solutions to many of the common roadblocks that teachers may face when teaching math to young children.

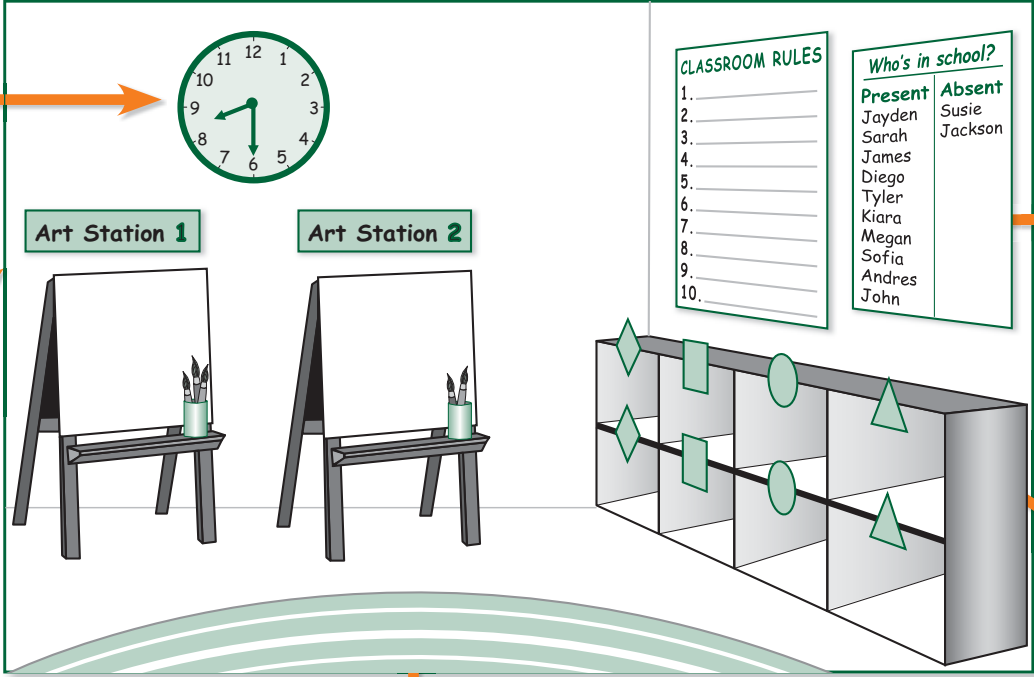
Figures, Tables, & Glossary

The graphics and figures in the guide visually illustrate particular concepts for teachers and children. Teachers can adapt the figures to their children's needs and incorporate them directly into the classroom. Other information is arranged into well-organized tables for educators to reference while lesson planning and teaching. Additionally, the WWC carefully defined nearly 30 terms in the glossary of the guide, providing teachers with a resource that they can quickly reference for clarification on a number of concepts.

Table of vocabulary words for types of measurement

Type of Measurement	Examples of Vocabulary Words
Length 	long, longer, longest; short, shorter, shortest
Size 	small, smaller, smallest; big, bigger, biggest
Temperature 	warm, warmer, warmest; cold, colder, coldest
Time 	early, earlier, earliest; late, later, latest
Weight 	heavy, heavier, heaviest; light, lighter, lightest

Creating a math-rich environment in the classroom



A readily available clock allows children to practice measuring time.

Work stations, cubbies, and activity centers offer opportunities to label and organize areas of the classroom in a way that supports learning.

Throughout the school year, children can help teachers track and organize information: attendance counts, who has a birthday each month, etc.

Shapes, numbers, and other math concepts can be placed at eye-level for children.

Teachers can incorporate patterns into classroom rugs, curtains, supplies, etc.