This document provides a summary of Recommendation 6 from the WWC practice guide Assisting Students Struggling with Mathematics: Response to Intervention (RtI) for Elementary and Middle Schools. Full reference at the bottom of last page.

CONTENT: Mathematics

GRADE LEVEL(S): K–8

LEVEL OF EVIDENCE: Moderate

Recommendation

Interventions at all grade levels should devote about 10 minutes in each session to building fluent retrieval of basic arithmetic facts.

Students with difficulties in mathematics often demonstrate lack of fluency with quick retrieval of basic arithmetic fact (e.g., $3 \times 9 =$ __ and $11 - 7 =$ __). This weak ability is likely to inhibit students' understanding of deeper mathematics concepts (e.g., rational numbers, the commutative property). For struggling students, devoting 10 minutes each day to building proficiency with quick retrieval of arithmetic facts can enhance their ability to grasp more advanced mathematics concepts.

How to carry out the recommendation

1. *Provide about 10 minutes per session of instruction to build quick retrieval of basic arithmetic facts. Consider using technology, flash cards, and other materials for extensive practice to facilitate automatic retrieval.*

Instructional strategies from the examples

- *Present facts in number families.*
- *Integrate previously learned facts into practice activities.*
- *Provide enough practice so retrieval becomes automatic.*

Interventions at all grade levels should devote about 10 minutes in each session to building fluent retrieval of basic arithmetic facts.

South Carolina standards alignment

- ***MATHEMATICS:*** *None*
  TEACHERS: *INST.AM.10, INST.TCK.2*

  The goal for students is the quick retrieval of facts without the use of pencil and paper or manipulatives. Teachers should present facts in number families (e.g., $7 \times 8 = 56$, $8 \times 7 = 56$, $56 \div 7 = 8$, and $56 \div 8 = 7$) to help build student's fluency. This also helps students learn about inverse operations. Additionally, teachers should incorporate cumulative review into these activities, integrating previously learned facts into students' practice activities and providing enough practice so retrieval for students become automatic.

  Note. The panel that developed the practice guide acknowledges that students who are proficient in grade-level mathematics may not need to practice each session but might still benefit from periodic, cumulative review.

Interventions at all grade levels should devote about 10 minutes in each session to building fluent retrieval of basic arithmetic facts.

2. Teach students in grades 2 through 8 how to use their knowledge of properties, such as commutative, associative, and distributive law, to derive facts in their heads. (Note: This is really step 3 in the practice guide, as step 2 focuses on K–2.)

3. Instructional strategies from the examples

- *Guide students to use properties of arithmetic (e.g., composition, decomposition, distributive property) to solve complex facts involving multiplication and division.*

4. South Carolina standards alignment

- ***MATHEMATICS:*** *PS.1a, PS.2a*
  TEACHERS: *INST.AM.4, INST.TCK.2, PLAN.SW.3*

Rather than solely rely on rote memorization of facts, teachers should guide students to use what they know about properties of mathematics to master more complex facts about multiplication and division. Teachers can teach students how to use composition and decomposition, as well as the distributive property, to help increase students' facility with retrieving multiplication facts more quickly.

5. Example of using mathematical properties to support multiplication facts

- *To understand and quickly produce the seemingly difficult multiplication fact* $13 \times 7 =$*, students recall that* $13 = 10 + 3$*, something they should have been taught consistently during their elementary career. Then, since* $13 \times 7 = (10 + 3) \times 7 = 10 \times 7 + 3 \times 7$*, the fact is parsed into easier, known problems* $10 \times 7 =$ *and* $3 \times 7 =$ *by applying the distributive property. Students can then rely on the two simpler multiplication facts (which they had already acquired) to quickly produce an answer mentally.*

Note. Adapted from example in text on page 39 in the practice guide.

Interventions at all grade levels should devote about 10 minutes in each session to building fluent retrieval of basic arithmetic facts.

Potential roadblocks and how to address them

Roadblock	Suggested Approach
Students may find fluency practice tedious and boring.	Games that provide students with the opportunity to practice new facts and review previously learned facts by encouraging them to beat their previous high score can help the practice become less tedious. Players may be motivated when their scores rise and the challenge increases.
Curricula may not include enough fact practice or may not have materials that lend themselves to teaching strategies.	Some contemporary curricula deemphasize fact practice, so this is a real concern. In this case, teachers should consider using a supplemental program, based in either flash cards or technology.

Reference: Gersten, R., Beckmann, S., Clarke, B., Foegen, A., Marsh, L., Star, J. R., & Witzel, B. (2009). Assisting students struggling with mathematics: Response to Intervention (RtI) for elementary and middle schools (NCEE 2009-4060). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance. https://ies.ed.gov/ncee/wwc/PracticeGuide/2