



## ***Using SOLVE-IT to Teach Math***

### **What is the evidence base?**

- This is a research-based practice for **students with disabilities** based on one methodologically sound group experimental study with random assignment across 161 participants (78 with disabilities and 83 average achieving students) and two methodologically sound single-case studies across nine participants with disabilities.
- This is a research-based practice for **students with learning disabilities** based on one methodologically sound group experimental study with random assignment across 161 participants (78 with disabilities and 83 average achieving students).
- This a promising practice for **students with spina bifida myelomeningocele (SBM; orthopedic impairment)** based on one methodologically sound single-case study across three participants with SBM.
- This is a promising practice for **students with other health impairments (OHI)** based on one methodologically sound single-case study across six participants with OHI.

### **Where is the best place to find out how to do this practice?**

The best place to find out how to implement SOLVE-IT is through the following research to practice lesson plan starters:

- [Mathematical Problem Solving – SOLVE – Lesson \(Freeman-Green et al., 2015\)](#)
- [Mnemonics to Teach Addition of Fractions – LAP – Lesson 1 \(Test & Ellis, 2005\)](#)
- [Mnemonics to Teach Addition of Fractions – LAP – Lesson 2 \(Test & Ellis, 2005\)](#)
- [Mnemonics to Teach Addition of Fractions – LAP – Lesson 3 \(Test & Ellis, 2005\)](#)

### **With who was it implemented?**

- Students with
  - Learning disabilities (1 student, n=78)
  - Other health impairment (1 study, n=6)
  - Spina bifida myelomeningocele/orthopedic impairment (1 study, n=3)
- Grades ranged from 7<sup>th</sup>–10<sup>th</sup>
- Males (n=90), females (n=80)
- Ethnicity
  - Caucasian (n=22)

- African American (n=44)
- Latino/Hispanic (n=99)

## What is the practice?

SOLVE is a specific instructional strategy, which is mnemonic-based to teach students to solve mathematical word problems (Freeman-Green, O'Brien, Wood, & Hitt, 2015). SOLVE stands for (a) study the problem, (b) organize the facts, (c) line up a plan, (d) verify your plan with action, and (e)examine your results (Freeman-Green et al., 2015).

*Solve It!* is a cognitive strategy intervention that has been used to help students learn about math problem-solving strategies (Coughlin & Montague, 2011; Krawec, Huang, Montague, Kressler, & Melia de Alba, 2013).

## Where has it been implemented?

- A small separate room outside of the general education class (1 study)
- General education/inclusive classrooms (1 study)
- Not specified (1 study)

## How does this practice relate to Common Core Standards?

- CCSS.MATH.CONTENT.7.NS.A.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
- CCSS.MATH.CONTENT.7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
- CCSS.MATH.CONTENT.5.NBT.B.5 Fluently Multiply multi-digit whole numbers using the standard algorithm.

## How does this practice relate to the Common Career Technical Core?

- Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
  - [https://careertech.org/sites/default/files/CCTC\\_Standards\\_Formatted\\_2014.pdf](https://careertech.org/sites/default/files/CCTC_Standards_Formatted_2014.pdf)
- Business Management & Administration Career Cluster Standard 1. Utilize mathematical concepts, skills and problem solving to obtain necessary information for decision making in business.

- Finance Career Cluster Standard 1. Utilize mathematical concepts, skills and problem solving to obtain necessary information for decision making in the finance industry
- Restaurants & Food/Beverage Services Career Pathway Standard 5. Research costs, pricing, market demands and marketing strategies to manage profitability in food and beverage service facilities.
- Science & Mathematics Career Pathway (ST-SM) Standard 1. Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.

## References used to establish this evidence base:

Couglin, J., & Montague, N. (2011). The effects of cognitive strategy instruction on the mathematical problem solving of adolescents with spina bifidia. *The Journal of Special Education, 45*, 171-183. doi: 10.1177/0022466910363913

Freeman-Green, S. M., O'Brien, C., Wood, C. L., & Hitt, S. B. (2015). Effects of the SOLVE strategy on the mathematical problem solving skills of secondary students with learning disabilities. *Learning Disabilities Research & Practice, 30*, 76-90. doi: 10.1111/ldrp.12054

Krawec, J., Huang, J., Montague, M., Kressler, B., & De Alba, A. M. (2013). The effects of cognitive strategy instruction on knowledge of math problem-solving processes of middle school students with learning disabilities. *Learning Disability Quarterly, 36*, 80-92. doi: 10.1177/0731948712463368

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