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Thank you for your request to our REL Reference Desk regarding evidence-based information about strategies for teaching problem solving skills to special education students. Ask A REL is a collaborative reference desk service provided by the ten regional educational laboratories (REL) that, by design, functions much in the same way as a technical reference library. It provides references, referrals, and brief responses in the form of citations on research based education questions.

The information below represents the most rigorous research available. Researchers consider the type of methodology and give priority to research reports that employ well described and thorough methods. The resources were also selected based on the date of the publication with a preference for research from the last ten years. Additional criteria for inclusion include the source and funder of the resource.

**Question:** *Are there research based strategies for teaching special education students problem solving skills?*

### **Search Process**

**Key words and search strings used in the search:** *problem solving strategies, special education, problem solving instruction, problem solving skills*

### **Search databases and websites:**

1. ERIC, <http://www.eric.ed.gov/>
2. JSTOR, <http://www.jstor.org/action/showAdvancedSearch>
3. Google Scholar, [www.google.com/scholar](http://www.google.com/scholar)
4. Institute of Education Sciences (IES) Resources, <http://ies.ed.gov>
5. What Works Clearinghouse, <http://ies.ed.gov/ncee/wwc/>

### **Sample Citations Retrieved:**

#### **Mathematics**

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). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. Retrieved from <http://ies.ed.gov/ncee/wwc/publications/practiceguides/>

**Abstract/Summary:** Response to Intervention (RtI) is an early detection, prevention, and support system that identifies struggling students and assists them before they fall behind. A recent survey of algebra teachers associated with the report identified key deficiencies of students entering algebra, including aspects of whole number arithmetic, fractions, ratios, and

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proportions. Our goal in this practice guide is to provide suggestions for assessing students' mathematics abilities and implementing mathematics interventions within an RtI framework, in a way that reflects the best evidence on effective practices in mathematics interventions.

Owen, R. L. & Fuchs, L. S. (2002). Mathematical problem-solving instruction for third-grade students with learning disabilities. *Remedial and Special Education, 23*(5), 268-278. doi: 10.1177/07419325020230050201

**Abstract/Summary:** This study evaluated a six-step strategy for solving mathematical word problems and partnered practice with 24 third-grade students with mild disabilities. Measures of process (use of the strategy regardless of correctness of answer) and product (finding correct answers) was significantly better than controls. Students' and teachers' attitudes about the strategy and working with a partner were positive.

Smith, L. F. & Montani, T. O., (2008). The effects of instructional consistency: Using manipulatives and teaching strategies to support resource room mathematics instruction. *Learning Disabilities: A Multidisciplinary Journal, 15*(2), 71-76.

**Abstract/Summary:** The benefits of multisensory instruction for teaching mathematics to students in resource rooms were explored. Participants were third and fourth graders (n = 12) in 3 resource rooms for replacement mathematics in a middle-class school district in New Jersey. The students received weekly instruction for several months, using manipulatives and word problem solving strategies with their on-going math replacement instruction. Error analyses were conducted on an ongoing basis with immediate corrective feedback given. Pre-post results indicated support for the hypothesis that performance increases through the use of multisensory materials and strategies. In particular, increases were observed in the use of base ten blocks, strategies for problem solving, and an overall improvement in calculation performance. Results are discussed in terms of the importance of consistent use of manipulatives and strategies in the resource classes. (Contains 3 tables and 2 figures.)

Kroesbergen, E. H. & Vanluit, J. E. H. (2003). Mathematical interventions for children with special education needs: A meta-analysis. *Remedial and Special Education, 24*(2), 97-114. doi: 10.1177/07419325030240020501

**Abstract/Summary:** This article presents the results of a meta-analysis of 58 studies of mathematics interventions for elementary students with special needs. Interventions in three different domains were selected: preparatory mathematics, basic skills, and problem solving strategies. The majority of the included studies described interventions in the domain of basic skills. In general, these interventions were also the most effective. Furthermore, a few specific

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characteristics were found to influence the outcomes of the studies. In addition to the duration of the intervention, the particular method of intervention proved important: Direct instruction and self-instruction were found to be more effective than mediated instruction. Interventions involving the use of computer assisted instruction and peer tutoring showed smaller effects than interventions not including these supports.

### Reading

Cantrell, S. C., Almasi, J. F., Carter, J. C., Rintamaa, M., Madden, A. (2010). The impact of a strategy-based intervention on the comprehension and strategy use of struggling adolescent readers. *Journal of Educational Psychology, 102*(2), 257-280. doi: 10.1037/a0018212

**Abstract/Summary:** This study examines the impact of the Learning Strategies Curriculum (LSC), an adolescent reading intervention program, on 6th- and 9th-grade students' reading comprehension and strategy use. Using a randomized treatment-control group design, the study compared student outcomes for these constructs for 365 students who received daily instruction in 6 LSC strategies and 290 students who did not receive intervention instruction. After 1 school year, 6th-grade students who received intervention instruction significantly outperformed students in the control group on a standardized measure of reading comprehension and reported using problem-solving strategies in reading to a greater extent than students in the control group. There were no significant differences between 9th grade intervention and control groups in reading comprehension or strategy use. (Contains 16 tables.)

Palincsar, A. S., & Brown, A. L. (1988). Teaching and practicing thinking skills to promote comprehension in the context of group problem solving. *Remedial and Special Education, 9*(1), 53-59. doi: 10.1177/074193258800900110

**Abstract/Summary:** Listening and reading comprehension are seen as problem-solving activities, which require instruction in thinking skills. An instructional technique, reciprocal teaching, is conducted as a group problem-solving activity to teach remedial and special education students to predict, question, summarize, and clarify while reading and listening to text.

### Social Skills

Killian, J. M., Killian, D. W. (2011). A school intervention to increase prosocial behavior and improve academic performance of at-risk students. *Improving Schools, 14*(1). 65-83. doi: 10.1177/1365480211399748

**Abstract/Summary:** The purpose of this pilot study was to investigate an intervention for at-risk elementary school students who did not respond sufficiently to a universal school-wide

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social skills program. The manualized social skills counseling intervention was implemented for two years, and sought to create and maintain appropriate student relating and problem solving, and to improve academic performance. The effectiveness of the intervention was determined using measures of behavior, grades, standardized tests, and need for special services collected pre- and post-intervention for individual students, the intervention group and a comparison group. Results suggest substantial positive intervention outcomes across multiple variables for individual students and between groups. Implications of this field based study are considered in terms of applied school practice.

Conte, R. (1995). A classroom-based social skills intervention for children with learning disabilities. *Journal of Educational Research*, 41(1), 84-102.

**Abstract/Summary:** A social skills program for learning disabled children consisting of coaching, role-playing, and information sharing was implemented over a 6-month period by a clinical psychologist in collaboration with classroom teachers. When compared to the control group, participants in the experimental program demonstrated greater social acceptance and improved social problem-solving skills.

Isbell, J. S. & Jolivette, K. (2011). Stop, think, proceed: Solving problems in the real world. *Intervention in School and Clinic*, 47(1), 31-38. doi: 10.1177/1053451211406542

**Abstract/Summary:** Prevalence reports indicate approximately half of all children diagnosed with autism spectrum disorder (ASD) have a mild form of the disorder such as high-functioning autism, Asperger syndrome, or pervasive developmental disorder-not otherwise specified. These disorders are referred to collectively as high-functioning autism spectrum disorders (HFASD). Students with HFASD often receive their academic instruction in the general education setting. Social skills deficits, challenging behaviors, and the underlying cognitive characteristics related to the behaviors may limit students' ability to function independently in the complex social environment of a typical high school. Strategy instruction is a promising intervention for helping students acquire skills to become effective social problem solvers, which may lead to improved adaptive functioning and independence. Special education teachers can use the self-regulation strategy development (SRSD) model to design a strategy for solving problems in the real world as part of a comprehensive social skill straining program.

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## Referrals

### **Organizations:**

- Council for Exceptional Children: <http://www.cec.sped.org/>
- WestEd: <http://www.wested.org/>

### ***Institute of Education Sciences Resources (IES):***

Publication search engine available at: <http://ies.ed.gov/pubsearch/>

### **Other Federally Funded Resources:**

- National Center on Response to Intervention: <http://www.rti4success.org/>
- Center on Instruction (<http://www.centeroninstructon.org>)
  - RTI: <http://www.centeroninstruction.org/topic.cfm?k=R>
  - Special Education: <http://www.centeroninstruction.org/topic.cfm?k=SE>
- National Dissemination Center for Children with Disabilities: <http://nichcy.org/>

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