

Schoolwide Implementation of Schema-Based Instruction for Mathematical Problem Solving: An Action Research Investigation

Authors : Sara J. Mills, Sally Howell

Abstract : The field of special education has long struggled to bridge the research to practice gap. There is ample evidence from research of effective strategies for students with special needs, but these strategies are not routinely implemented in schools in ways that yield positive results for students. In recent years, the field of special education has turned its focus to implementation science. That is, discovering effective methods of implementing evidence-based practices in school settings. Teacher training is a critical factor in implementation. This study aimed to successfully implement Schema-Based Instruction (SBI) for math problem solving in four classrooms in a special primary school serving students with language deficits, including students with Autism Spectrum Disorders (ASD) and Intellectual Disabilities (ID). Using an action research design that allowed for adjustments and modification to be made over the year-long study, two cohorts of teachers across the school were trained and supported in six-week learning cycles to implement SBI in their classrooms. The learning cycles included a one-day training followed by six weeks of one-on-one or team coaching and three fortnightly cohort group meetings. After the first cohort of teachers completed the learning cycle, modifications and adjustments were made to lesson materials in an attempt to improve their effectiveness with the second cohort. Fourteen teachers participated in the study, including master special educators (n=3), special education instructors (n=5), and classroom assistants (n=6). Thirty-one students participated in the study (21 boys and 10 girls), ranging in age from 5 to 12 years (M = 9 years). Twenty-one students had a diagnosis of ASD, 20 had a diagnosis of mild or moderate ID, with 13 of these students having both ASD and ID. The remaining students had diagnosed language disorders. To evaluate the effectiveness of the implementation approach, both student and teacher data was collected. Student data included pre- and post-tests of math word problem solving. Teacher data included fidelity of treatment checklists and pre-post surveys of teacher attitudes and efficacy for teaching problem solving. Finally, artifacts were collected throughout the learning cycle. Results from cohort 1 and cohort 2 revealed similar outcomes. Students improved in the number of word problems they answered correctly and in the number of problem-solving steps completed independently. Fidelity of treatment data showed that teachers implemented SBI with acceptable levels of fidelity (M = 86%). Teachers also reported increases in the amount of time spent teaching problem solving, their confidence in teaching problem solving and their perception of students' ability to solve math word problems. The artifacts collected during instruction indicated that teachers made modifications to allow their students to access the materials and to show what they knew. These findings are in line with research that shows student learning can improve when teacher professional development is provided over an extended period of time, actively involves teachers, and utilizes a variety of learning methods in classroom contexts. Further research is needed to evaluate whether these gains in teacher instruction and student achievement can be maintained over time once the professional development is completed.

Keywords : implementation science, mathematics problem solving, research-to-practice gap, schema based instruction

Conference Title : ICSNEERP 2019 : International Conference on Special Needs Education, Educational Reforms and Practices

Conference Location : Venice, Italy

Conference Dates : April 11-12, 2019