

Reading

A Synthesis of Research on Informational Text Reading Interventions for Elementary Students With Learning Disabilities

Ciullo, S., Sabrina Lo, Y.-L., Wanzek, J., & Reed, D. K. (2016). A Synthesis of Research on Informational Text Reading Interventions for Elementary Students With Learning Disabilities. *Journal of Learning Disabilities, 49*(3), 257–271. Retrieved from <https://doi.org/10.1177/0022219414539566>

This research synthesis was conducted to understand the effectiveness of interventions designed to improve learning from informational text for students with learning disabilities in elementary school (K-5). The authors identified 18 studies through a comprehensive search. The interventions were evaluated to determine treatment effects and to understand implementation and methodological variables that influenced outcomes. Moderate to large effect sizes on researcher-developed measures for cognitive strategy interventions were reported. Interventions that utilized graphic organizers as study guides to support social studies learning were also associated with improved outcomes. The findings are considered within the context of limited implementation of standardized measures. The authors extend findings from previous research by reporting a paucity of interventions to enhance higher-level cognitive and comprehension skills. The majority of reviewed studies targeted fact acquisition and main idea identification, and overall encouraging findings were noted for these skills. Implications for future research are discussed.

A Meta-Analysis of Interventions for Struggling Readers in Grades 4–12: 1980–2011

Scammacca, N. K., Roberts, G., Vaughn, S., & Stuebing, K. K. (2015). A Meta-Analysis of Interventions for Struggling Readers in Grades 4–12: 1980–2011. *Journal of Learning Disabilities, 48*(4), 369–390. Retrieved from <https://doi.org/10.1177/0022219413504995>

This meta-analysis synthesizes the literature on interventions for struggling readers in Grades 4 through 12 published between 1980 and 2011. It updates Scammacca et al.'s analysis of studies published between 1980 and 2004. The combined corpus of 82 study-wise effect sizes was meta-analyzed to determine (a) the overall effectiveness of reading interventions studied over the past 30 years, (b) how the magnitude of the effect varies based on student, intervention, and research design characteristics, and (c) what differences in effectiveness exist between more recent interventions and older ones. The analysis yielded a mean effect of 0.49, considerably smaller than the 0.95 mean effect reported in 2007. The mean effect for standardized measures was 0.21, also much smaller than the 0.42 mean effect reported in 2007. The mean effects for reading comprehension measures were similarly diminished. Results indicated that the mean effects for the 1980–2004 and 2005–2011 groups of studies were different to a statistically significant degree. The decline in effect sizes over time is attributed at least in part to increased use of standardized measures, more rigorous and complex research designs, differences in participant characteristics, and improvements in the

school's "business-as-usual" instruction that often serves as the comparison condition in intervention studies.

Writing

A Comprehensive Meta-analysis of Handwriting Instruction

Santangelo, Tanya & Graham, Steve. (2015). A Comprehensive Meta-analysis of Handwriting Instruction. *Educational Psychology Review*. 28. 10.1007/s10648-015-9335-1.

While there are many ways to author text today, writing with paper and pen (or pencil) is still quite common at home and work, and predominates writing at school. Because handwriting can bias readers' judgments about the ideas in a text and impact other writing processes, like planning and text generation, it is important to ensure students develop legible and fluent handwriting. This meta-analysis examined true- and quasi-experimental intervention studies conducted with K-12 students to determine if teaching handwriting enhanced legibility and fluency and resulted in better writing performance. When compared to no instruction or non-handwriting instructional conditions, teaching handwriting resulted in statistically greater legibility (ES = 0.59) and fluency (ES = 0.63). Motor instruction did not produce better handwriting skills (ES = 0.10 for legibility and -0.07 for fluency), but individualizing handwriting instruction (ES = 0.69) and teaching handwriting via technology (ES = 0.85) resulted in statistically significant improvements in legibility. Finally, handwriting instruction produced statistically significant gains in the quality (ES = 0.84), length (ES = 1.33), and fluency of students' writing (ES = 0.48). The findings from this meta-analysis provide support for one of the assumptions underlying the Simple View of Writing (Berninger et al., *Journal of Educational Psychology*, 94, 291–304, 2002): text transcription skills are an important ingredient in writing and writing development.

A Meta-Analysis of Writing Instruction for Students in the Elementary Grades

Graham, S., McKeown, D., Kiuahara, S. & Harris, K. (2012). A Meta-analysis of writing instruction for students in the elementary grades. *Journal of Educational Psychology*, 104(4), 879-896. Retrieved from <https://doi.org/10.1037/a0029185>

In an effort to identify effective instructional practices for teaching writing to elementary grade students, we conducted a meta-analysis of the writing intervention literature, focusing our efforts on true and quasi-experiments. We located 115 documents that included the statistics for computing an effect size (ES). We calculated an average weighted ES for 13 writing interventions. To be included in the analysis, a writing intervention had to be tested in 4 studies. Six writing interventions involved explicitly teaching writing processes, skills, or knowledge. All but 1 of these interventions (grammar instruction) produced a statistically significant effect: strategy instruction (ES = 1.02), adding self-regulation to strategy instruction (ES = 0.50), text structure instruction (ES = 0.59), creativity/imagery instruction (ES = 0.70), and teaching transcription skills (ES = 0.55). Four writing interventions involved procedures for scaffolding or supporting students' writing. Each of these interventions produced statistically significant effects: prewriting activities (ES = 0.54), peer assistance when writing (ES = 0.89), product goals (ES = 0.76), and assessing writing (0.42). We also found that word processing (ES = 0.47), extra writing (ES = 0.30), and comprehensive writing programs (ES = 0.42) resulted in a statistically significant improvement in the quality of students' writing. Moderator analyses revealed that the self-regulated strategy development model (ES = 1.17) and process approach to writing instruction (ES = 0.40) improved how well students wrote.

Research-Based Writing Practices and the Common Core: Meta-analysis and Meta-synthesis

Graham, Steve & Harris, Karen & Santangelo, Tanya. (2015). Research-Based Writing Practices and the Common Core. *The Elementary School Journal*. 115. 000-000. 10.1086/681964.

In order to meet writing objectives specified in the Common Core State Standards (CCSS), many teachers need to make significant changes in how writing is taught. While CCSS identified what students need to master, it did not provide guidance on how teachers are to meet these writing benchmarks. The current article presents research-supported practices that can be used to meet CCSS writing objectives in kindergarten to grade 8. We identified these practices by conducting a new meta-analysis of writing intervention studies, which included true and quasi-experiments, as well as single-subject design studies. In addition, we conducted a meta-synthesis of qualitative studies examining the practices of exceptional literacy teachers. Studies in 20 previous reviews served as the data source for these analyses. The recommended practices derived from these analyses are presented within a framework that takes into account both the social contextual and cognitive/motivational nature of writing.

Mathematics

Interventions for Children With Mathematical Difficulties: A Meta-Analysis

Chodura, S., Kuhn, J.-T., & Holling, H. (2015). Interventions for children with mathematical difficulties: A meta-analysis. *Zeitschrift für Psychologie*, 223(2), 129-144. Retrieved from <http://dx.doi.org/10.1027/2151-2604/a000211>

The purpose of this study was to meta-analyze the effectivity of interventions for children with mathematical difficulties. Furthermore, we investigated whether the fit between characteristics of participants and interventions was a decisive factor. Thirty-five evaluation studies that used pre-post-control group designs with at least 10 participants per group were analyzed. Using a random-effects model, we found a high, significant mean effect ($\theta = 0.83$) for the standardized mean difference. Moreover, a significant effect was found for studies that used direct or assisted instruction, that fostered basic arithmetical competencies, and that used single-subject settings. Effect size was not moderated by administration mode (computer-based vs. face-to-face intervention) or by whether interventions were derived from theory. Interventions for children with at-risk dyscalculia were effective on average. Results of the fit between characteristics of the participants and intervention characteristics are provided. In summary, mathematics interventions are found to be effective for children with mathematical difficulties, though there was a high effect size variance between studies.

Mathematics Interventions for Upper Elementary and Secondary Students: A Meta-Analysis of Research

Stevens, E. A., Rodgers, M. A., & Powell, S. R. (2018). Mathematics Interventions for Upper Elementary and Secondary Students: A Meta-Analysis of Research. *Remedial and Special Education*, 39(6), 327–340. <https://doi.org/10.1177/0741932517731887>

The purpose of this review was to conduct a meta-analysis of 25 years of mathematics interventions for students with mathematics difficulty or disability in Grades 4 through 12. A search of the literature yielded 25 studies that met the inclusion criteria. Studies were coded to extract important study information (e.g., participant information, research design, description of treatment, and comparison groups) and data needed to calculate Hedge's g . We used robust variance estimation (RVE) to address dependence resulting from multiple outcomes per study. The RVE random-effects model estimated a treatment effect of 0.85. After adjusting for small-study effects, the final model estimated an underlying, moderate effect of 0.49 with a large amount of unexplained heterogeneity between studies. Studies with more than 15 hr of treatment and those focused on fraction content significantly moderated mathematics outcomes. Findings are limited by extreme variability across study estimates, the lack of standardized mathematics measures, and a limited number of studies across 25 years of research.

Mathematical Interventions for Secondary Students With Learning Disabilities and Mathematics Difficulties: A Meta-Analysis

Jitendra, A. K., Lein, A. E., Im, S., Alghamdi, A. A., Hefte, S. B., & Mouanoutoua, J. (2018). Mathematical Interventions for Secondary Students With Learning Disabilities and Mathematics

Difficulties: A Meta-Analysis. *Exceptional Children*, 84(2), 177–196. <https://doi.org/10.1177/0014402917737467>

This meta-analysis is the first to provide a quantitative synthesis of empirical evaluations of mathematical intervention programs implemented in secondary schools for students with learning disabilities and mathematics difficulties. Included studies used a treatment-control group design. A total of 19 experimental and quasi-experimental studies containing 20 independent samples met study inclusion criteria. Results of a random effects model analysis indicated that mathematical interventions influence mathematics outcomes ($g = 0.37$, 95% confidence interval [0.18, 0.56]) for students with learning disabilities and mathematics difficulties. In addition, instructional time moderated the relation between mathematics interventions and student learning. Limitations of the study, future directions for research, and implications for practice are discussed.

Science

Reading Instruction in Science for Students With Learning Disabilities: A Meta-Analysis

Kaldenberg, E. R., Watt, S. J., & Therrien, W. J. (2015). Reading Instruction in Science for Students With Learning Disabilities: A Meta-Analysis. *Learning Disability Quarterly*, 38(3), 160–173. Retrieved from <https://doi.org/10.1177/0731948714550204>

As a growing number of students with learning disabilities (LD) receive science instruction in general education settings, students with LD continue to perform significantly lower than their non-disabled peers. The shift from textbook-driven instruction to inquiry-based approaches to science learning supports students who struggle with reading. However, research continues to show that for students to fully access the science curriculum, it is critical to address effective ways to increase reading comprehension of expository science text. This meta-analysis identified 20 studies from 12 articles that evaluated the efficacy of such interventions. Effect sizes were calculated for each study. Across all studies, a mean effect size (ES) of 0.98 was obtained. Findings align with past research on reading comprehension of expository text indicating that students with LD benefit from explicit vocabulary instruction (ES = 1.25) and the use of multicomponent interventions (ES = 0.64) when reading science-related material.