

REL Pacific Ask A REL Response

Curriculum & Instruction

October 2020

Question:

What rigorous evidence exists to support teaching students meta-cognitive strategies to build comprehension?

Response:

Following an established REL Pacific research protocol, we conducted a web-based search for methodologically rigorous resources related to the effect of teaching meta-cognitive strategies to students to build their comprehension (see Methods section for search terms and resource selection criteria). We first prioritized studies in the Pacific and other Indigenous contexts for greater relevancy to our partners in the Pacific region; however, we included studies with more generalizable findings due to the limited amount of research available in these contexts.

References are listed in alphabetical order, not necessarily in order of relevance. Descriptions of the resources are quoted directly from the publication abstracts. We have not evaluated the quality of references and the resources provided in this response. We offer them only for your reference. Also, our search included the most commonly used research resources, but they are not comprehensive and other relevant references and resources may exist.

Research References

Festas, I., Oliveira, A. L., Rebelo, J. A., Damião, M. H., Harris, K., & Graham, S. (2015). Professional development in self-regulated strategy development: Effects on the writing performance of eighth grade Portuguese students. *Contemporary Educational Psychology, 40*, 17–27.

<https://doi.org/10.1016/j.cedpsych.2014.05.004>

From the abstract: “We examined the effects of the Self-Regulated Strategy Development (SRSD) for opinion essay writing among 380 eighth grade students in six urban middle schools in a major city in Portugal. Fourteen teachers in six urban middle schools in Portugal participated in the present study; 7 of these teachers participated in practice-based professional development (PBD) in SRSD before implementation, and follow-up support once instruction began. Schools were matched in pairs based on SES and teacher characteristics; a member of each pair was randomly assigned to either: (a) teacher led SRSD instruction for opinion essay writing; or (b) teacher implementation of the schools’ existing curriculum and language program prescriptions for opinion writing. Students in the experimental schools were taught strategies for planning and composing opinion essays once a week in 45 min sessions, over a three-month period. [SRSD ‘...combines the teaching of writing processes (including planning, drafting, composing, revising and evaluating); instruction in writing strategies; and development of self-

regulation strategies, including goal-setting, self-assessment (self-monitoring and self-recording), self-instruction, and self-reinforcement. ... Such strategies for writing and self-regulation are developed in six recursive, interactive, individualized instructional stages with gradual release of responsibility for writing to students: (1) develop and activate background knowledge; (2) discuss and describe the strategies to be learned; (3) model the strategies; (4) memorize the strategies; (5) support the strategies; and (6) independent performance' (p. 18).] Multilevel modeling for repeated measures indicated SRSD instructed students made statistically greater gains in composition elements than the comparison students immediately after instruction and two months later. Teachers implemented SRSD with fidelity and teachers and students rated the intervention favorably. This study provides initial evidence for replication of the effects of PBPD and SRSD outside of the United States. Limitations, lessons learned, and directions for future research are discussed."

Jitendra, A. K., Star, J. R., Starosta, K., Leh, J. M., Sood, S., Caskie, G., & Mack, T. R. (2009). Improving seventh grade students' learning of ratio and proportion: The role of schema-based instruction. *Contemporary Educational Psychology, 34*(3), 250–264. <https://eric.ed.gov/?id=EJ847632>

From the abstract: "The present study evaluated the effectiveness of an instructional intervention (schema-based instruction, SBI) that was designed to meet the diverse needs of middle school students by addressing the research literatures from both special education and mathematics education. Specifically, SBI emphasizes the role of the mathematical structure of problems and also provides students with a heuristic to aid and self-monitor problem solving. Further, SBI addresses well-articulated problem-solving strategies and supports flexible use of the strategies based on the problem situation. One hundred forty-eight seventh-grade students and their teachers participated in a 10-day intervention on learning to solve ratio and proportion word problems, with classrooms randomly assigned to SBI or a control condition. Results suggested that students in SBI treatment classes outperformed students in control classes on a problem-solving measure, both at posttest and on a delayed posttest administered four months later. However, the two groups' performance was comparable on a state standardized mathematics achievement test."

Kim, J., Olson, C. B., Scarcella, R., Kramer, J., Pearson, M., van Dyk, D., Collins, P. & Land, R. (2011). A randomized experiment of a cognitive strategies approach to text-based analytical writing for mainstreamed Latino English language learners in grades 6 to 12. *Journal of Research on Educational Effectiveness, 4*(3), 231–263. <https://eric.ed.gov/?id=EJ932553>

From the abstract: "This study reports Year 1 findings from a multisite cluster randomized controlled trial of a cognitive strategies approach [i.e., showing learners how accomplished readers approach texts to comprehend them, including setting goals and establishing priorities for reading, recalling prior knowledge and mental models, asking questions as they read, summarizing key points, self-assessing comprehension, and revising mental models and meaning] to teaching text-based analytical writing for mainstreamed Latino English language learners (ELLs) in 9 middle schools and 6 high schools.. There were 103 English teachers stratified by school and grade and then randomly assigned to the Pathway Project professional development intervention or control group. The Pathway Project trains teachers to use a pretest on-demand writing assessment to improve text-based analytical writing instruction for mainstreamed Latino ELLs who are able to participate in regular English classes. The intervention draws

on well-documented instructional frameworks for teaching mainstreamed ELLs. Such frameworks emphasize the merits of a cognitive strategies approach that supports these learners' English language development. Pathway teachers participated in 46 hrs of training and learned how to apply cognitive strategies by using an on-demand writing assessment to help students understand, interpret, and write analytical essays about literature. Multilevel models revealed significant effects on an on-demand writing assessment ($d = .35$) and the California Standards Test in English language arts ($d = .07$)."

Limpo, T., & Alves, R. A. (2014). Implicit theories of writing and their impact on students' response to a SRSD intervention. *British Journal of Educational Psychology*, *84*(4), 571–590.

<https://eric.ed.gov/?id=EJ1045381>

From the abstract: "In the field of intelligence research, it has been shown that some people conceive intelligence as a fixed trait that cannot be changed (entity beliefs), whereas others conceive it as a malleable trait that can be developed (incremental beliefs). What about writing? Do people hold similar implicit theories about the nature of their writing ability? Furthermore, are these beliefs likely to influence students' response to a writing intervention? We aimed to develop a scale to measure students' implicit theories of writing (pilot study) and to test whether these beliefs influence strategy-instruction effectiveness (intervention study). In the pilot and intervention studies participated, respectively, 128 and 192 students (Grades 5–6). Based on existing instruments that measure self-theories of intelligence, we developed the Implicit Theories of Writing (ITW) scale that was tested with the pilot sample. In the intervention study, 109 students received planning instruction based on the self-regulated strategy development model, whereas 83 students received standard writing instruction. Students were evaluated before, in the middle, and after instruction. ITW's validity was supported by piloting results and their successful cross-validation in the intervention study. In this, intervention students wrote longer and better texts than control students. Moreover, latent growth curve modelling showed that the more the intervention students conceived writing as a malleable skill, the more the quality of their texts improved. This research is of educational relevance because it provides a measure to evaluate students' implicit theories of writing and shows their impact on response to intervention."

Olson, C. B., Matuchniak, T., Chung, H. Q., Stumpf, R., & Farkas, G. (2017). Reducing achievement gaps in academic writing for Latinos and English learners in Grades 7–12. *Journal of Educational Psychology*, *109*(1), 1–21. <https://eric.ed.gov/?id=EJ1125530>

From the abstract: "This study reports 2 years of findings from a randomized controlled trial designed to replicate and demonstrate the efficacy of an existing, successful professional development program, the Pathway Project, that uses a cognitive strategies approach to text-based analytical writing. Building on an earlier randomized field trial in a large, urban, low socioeconomic status (SES) district in which 98% of the students were Latino and 88% were mainstreamed English learners (ELs) at the intermediate level of fluency, the project aimed to help secondary school students, specifically Latinos and mainstreamed ELs, in another large, urban, low-SES district to develop the academic writing skills called for in the rigorous Common Core State Standards for English Language Arts. The Pathway Project draws on well-documented instructional frameworks that support approaches that incorporate strategy instruction to enhance students' academic literacy. Ninety-five teachers in 16 secondary schools

were stratified by school and grade and then randomly assigned to the Pathway or control group. Pathway teachers participated in 46 hr of training to help students write analytical essays. Difference-in-differences and regression analyses revealed significant effects on student writing outcomes in both years of the intervention (Year 1, $d = 0.48$; Year 2, $d = 0.60$). Additionally, Pathway students had higher odds than control students of passing the California High School Exit Exam in both years.”

Wijekumar, K. K., Meyer, B. J. F., & Lei, P. (2012). Large-scale randomized controlled trial with 4th graders using intelligent tutoring of the structure strategy to improve nonfiction reading comprehension. *Educational Technology Research and Development*, *60*(6), 987–1013. <https://eric.ed.gov/?id=EJ986753>

From the abstract: “Reading comprehension is a challenge for K-12 learners and adults. Nonfiction texts, such as expository texts that inform and explain, are particularly challenging and vital for students’ understanding because of their frequent use in formal schooling (e.g., textbooks) as well as everyday life (e.g., newspapers, magazines, and medical information). The structure strategy is explicit instruction about how to strategically use knowledge about text structures for encoding and retrieval of information from nonfiction and has consistently shown significant improvements in reading comprehension. We present the delivery of the structure strategy using a web-based intelligent tutoring system (ITSS) that has the potential to offer consistent modeling, practice tasks, assessment, and feedback to the learner. Finally, we report on statistically significant findings from a large scale randomized controlled efficacy trial with rural and suburban 4th-grade students using ITSS.”

Xin, Y. P., Jitendra, A. K., & Deatline-Buchman, A. (2005). Effects of mathematical word problem-solving instruction on middle school students with learning problems. *The Journal of Special Education*, *39*(3), 181–192. <https://eric.ed.gov/?id=EJ722297>

From the abstract: “This study investigated the differential effects of two problem-solving instructional approaches—schema-based instruction (SBI) and general strategy instruction (GSI)—on the mathematical word problem-solving performance of 22 middle school students who had learning disabilities or were at risk for mathematics failure. Results indicated that the SBI group significantly outperformed the GSI group on immediate and delayed posttests as well as the transfer test. Implications of the study are discussed within the context of the new IDEA amendment and access to the general education curriculum.”

Additional Organizations to Consult

The IRIS Center at Vanderbilt University. <https://iris.peabody.vanderbilt.edu/>

From the website: “The IRIS Center offers a wide variety of resources and services to suit a diverse set of instructional needs and circumstances. In this section, you will learn more about those services and resources, including how they are created and disseminated to IRIS users and educational programs in the United States and around the world.

Note: Please refer to their resources on [Schema Instruction](#), and [Meta-Cognitive Strategies](#).

Methods

Keywords and Search Strings

The following keywords and search strings were used to search the reference databases and other sources:

- "Meta-cognitive"
- "Cognitive"

Databases and Resources

Because the requestor specifically asked for rigorous research on this topic, we searched the [What Works Clearinghouse](#) (WWC) using their *Find Evidence: Reviews of individual studies* search tool. The WWC evaluates research methodologies according to a strict set of rigorous criteria including random assignment to experimental and control groups. We searched for studies that met WWC criteria with or without exceptions, looking for studies that demonstrated at least one statistically significant finding.

Reference Search and Selection Criteria

REL Pacific searched the What Works Clearinghouse for studies that were published in English-language peer-reviewed research journals within the last 20 years. Sources included in this document were last accessed in October 2020.

REL Pacific prioritized documents that are accessible online and publicly available, and prioritized references that provide practical information based on peer-reviewed research for the teachers and education leaders who requested this Ask A REL.¹ For questions with small or nonexistent research bases, we may rely on, for example, white papers, guides, reviews in non-peer-reviewed journals, interviews with content specialists, and organization websites. Additional methodological priorities/considerations given in the review and selection of the references were:

- Study types—randomized control trials, quasi experiments, surveys, descriptive data analyses, literature reviews, etc.
- Target population, sample size, study duration, etc.
- Limitations, generalizability of the findings and conclusions, etc.

¹ This memorandum is one in a series of quick-turnaround responses to specific questions posed by education stakeholders in the Pacific Region (American Samoa, the Commonwealth of the Northern Mariana Islands, the Federated States of Micronesia, Guam, Hawai'i, the Republic of the Marshall Islands, and the Republic of Palau), which is served by the Regional Educational Laboratory (REL Pacific) at McREL International. This memorandum was prepared by REL Pacific under a contract with the U.S. Department of Education's Institute of Education Sciences (IES), Contract ED-IES-17-C-0010, administered by McREL International. Its content does not necessarily reflect the views or policies of IES or the U.S. Department of Education, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.