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A Systematic Review of Reading Comprehension Instruction and Intervention for Adolescent Learners

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Abstract

This systematic review examines experimental studies of reading interventions that address and measure reading comprehension outcomes among adolescent learners. This review includes studies published between 2014 and 2025 involving students in grades four through nine across 62 studies, including randomized controlled trials, quasi-experimental, and single-case designs. The findings indicate that interventions embedding reading instruction in science and social studies, those utilizing explicit instruction of comprehension strategies, and those focusing on activating background knowledge, identifying main ideas, and summarizing yielded positive effects on reading comprehension.

Introduction

Students with poor reading comprehension skills experience missed opportunities to access grade level content (Vaughn et al., 2022). This is particularly true from third grade onward, as students are increasingly expected to learn through reading. To learn from textbooks, adolescents must develop skills for comprehending expository text, a genre that presents challenges not encountered in narrative texts (Nippold, 2017), which often follow a more predictable and sequential structure (Wu et al., 2020). In the upper elementary grades and beyond, the narrative genres assigned grow progressively more complex as well, demanding greater language comprehension skill and background knowledge from the reader. For academic success, it is critical that adolescents gain proficiency in reading comprehension. To support this skill development, teachers must become adept in teaching reading beyond the primary grades.

Multiple reading theories have modeled the skills and processes that drive skillful reading. The simple view of reading (SVR; Gough & Tunmer, 1986; Hoover & Gough, 1990) offers a model of the capacities underlying reading comprehension. Namely, reading comprehension is conceptualized as the multiplicative product of word recognition and language comprehension (i.e., RC = WR x LC; Hoover & Tunmer, 2021). If either word reading or language comprehension is equal to zero, then

reading comprehension will be zero as well, and strength in one capacity cannot make up for weakness in the other. The SVR models only the proximal capacities (word recognition and language comprehension) driving reading comprehension, but it accommodates the many distal components and processes (e.g., phonological awareness, letter-sound knowledge, vocabulary, working memory) that impact reading and its acquisition (Hoover & Tunmer, 2022). For example, phonics skills are not represented in the SVR, but neither is their importance negated. Rather, it may be understood that without well-developed phonics, skills word recognition will be limited. Therefore, phonics represents a distal skill necessary for word recognition which underlies reading comprehension.

In their examination of the SVR, Joshi and Aaron (2000) compared the multiplicative model (RC = WR x LC) to an additive model (RC = WR + LC). They determined the models were similarly able to explain reading comprehension but found the multiplicative model was better able to represent a wide variety of reading abilities. They also tested the extent to which reading speed contributed to variance in reading comprehension. They found that the SVR explained 48% of the variance in reading achievement and that letter naming speed accounted for an additional 10% of variance (Joshi & Aaron, 2000). Thus, they proposed a Component Model of reading (RC = WR x LC + S) which added speed to the SVR to increase predictive power. Additional theories, including the Direct and Inferential Mediation model of reading (DIME; Cromley & Azevedo, 2007) and the Active View of reading (Duke & Cartwright, 2021) have presented process models representing the impact and interactions of a variety of component skills essential to reading comprehension. Duke and Cartwright (2021) suggest that perhaps the most frequently referenced model after the SVR is the Scarborough (2001) reading rope. Scarborough's rope expands upon the SVR and illustrates the components of word recognition (i.e., phonological awareness, decoding, sight recognition) and language comprehension (i.e., background knowledge, vocabulary, language structures, verbal reasoning, and literacy knowledge). Each component is represented by a strand within the rope. As the strands are twisted and bound tightly together to form a single rope, word recognition becomes more automatic, and language comprehension becomes more strategic, resulting in text comprehension. These models provide frameworks that guide much of the reading comprehension research informing current instructional practice recommendations.

In the past decade, several meta-analyses (Filderman et al., 2022; Hebert et al., 2016; Peng et al., 2023; Scammacca et al., 2015; Sohn et al., 2023; Swanson et al., 2017) and systematic reviews (Hall-Mills & Marante, 2022) have examined the impacts of adolescent reading instruction and interventions on reading comprehension outcomes, with each reporting an overall large effect size (i.e., 0.8 or greater). . Most analyses focused on struggling readers, but Swanson et al. (2017) and Hebert et al.

(2016) examined effects on adolescents with and without reading difficulties. Swanson et al. analyzed impacts of Tier 1 instruction, finding an overall large effect size (g = 0.09) across 25 studies. They found that while no single variable (i.e., intervention type, dosage, grade level, research design) reliably predicted effect size, participants who received at least one of the Tier 1 instructional components studied performed better than peers who did not receive the component(s). Hebert et al. (2016) examined the effects of text structure instruction on reading comprehension. Although their analysis included participants in grades two through twelve, they found text structure instruction to be equally effective at secondary and elementary levels, with a medium effect size on researcher-created measures (g = 0.57). They noted that larger effects were observed when more text structures were taught and when instruction included a writing component.

The remaining systematic review and meta-analyses examined effects of reading instruction and interventions for adolescents with reading difficulties, including those with disabilities. Scammacca et al. (2015) analyzed studies of reading interventions broadly that targeted struggling readers. Their analysis included 67 research reports showing a moderate mean effect of 0.45. Although this represents a decrease in mean effect compared to their previous (Scammacca et al., 2007) meta-analysis on this topic, the authors attribute this phenomenon to increased rigor in both research practices and business as usual instruction, and they state that reading interventions clearly yield positive results and produce greater annual growth for adolescents than would otherwise be achieved. Sohn et al. (2023) analyzed interventions which aimed to improve adolescent reading comprehension outcomes for adolescents with reading difficulties. They noted substantial heterogeneity in effect sizes but found a mean effect of 0.63 across 37 studies with larger effects associated with interventions delivered by researchers and those lasting two months or less. Filderman et al. (2022) examined 64 studies of reading comprehension interventions, finding a moderate mean effect on comprehension outcomes (g = 0.59). Larger effects were associated with comprehension strategy instruction and background knowledge instruction. In their systematic review of the impact of explicit text structure instruction on comprehension of expository texts, Hall-Mills and Marante (2022) determined that moderately strong evidence exists in favor of explicit text structure instruction for students with and at risk for learning disabilities (LD) with effect sizes ranging from 0.31 to 2.17. Finally, Peng et al. (2023) conducted a meta-analysis examining the effectiveness of commonly researched reading comprehension strategies. They found that although no reading comprehension strategy was most effective on its own, background knowledge instruction was a necessary component of effective interventions. Additionally, the combination of main idea, text structure, and retell strategies appeared more effective than other single strategies and strategy combinations.

Purpose of Study

Based on findings from existing reviews and meta-analyses, there is moderate to strong evidence for explicitly teaching reading comprehension strategies to support adolescent readers. Additionally, the What Works Clearinghouse (WWC) issued a practice guide in 2008 recommending this practice to educators of students in grades four through nine (Kamil et al., 2008). The present review builds upon the recommendation to provide direct and explicit comprehension strategy instruction by synthesizing the adolescent reading comprehension intervention literature published since 2008.

Research Questions

1. What instructional and intervention characteristics and student characteristics have been tested as part of reading comprehension interventions?
2. What does the research say about the effectiveness of reading comprehension instruction in improving adolescent reading outcomes for readers in grades four through nine?
3. What features of instructional interventions (e.g., type of instruction, duration, grade level) are associated with improved outcomes? Do these features differ according to student characteristics?

Method

Study Eligibility Criteria

The present systematic review included studies of adolescent reading comprehension instruction and interventions based on the following criteria:

- Participants were students in fourth through ninth grade (ages 9 years 0 months through 15 years 11 months);
- The study was published in English from January 2014 to April 2025 and took place in the United States;
- The study was published in a peer reviewed journal. Conference papers and dissertations were not eligible;
- The study investigated a practice or curriculum implemented with children, not related to teacher professional learning, teacher preparation, textbook design, or school reform;
- The study included at least one outcome related to intervention, instruction, strategy, curriculum, program, or treatment on multisyllabic word reading;
- The study utilized an experimental design; and
- The study was not limited to participants with low-incidence disabilities (e.g., visual impairments, auditory impairments, traumatic brain injury).

Search Strategy

To identify studies for inclusion, I conducted a search of four electronic databases (Academic Search Complete, APA PsycINFO, ERIC, Education Full Text) using the following terms: (comprehension or meaning or understand*) AND (interven* or curricul* or program* or train* or approach* or monitor* or strateg* or instruct* or teach* or treat*) AND (read* or literacy or ELA). After de-duplication, this search returned 6,235 records, 5,939 of which were excluded at the title and abstract screening phase. I screened 245 records at the full-text level. Of these, 60 records (including 62 studies) met criteria for inclusion. The full screening process, including reasons for exclusion, is displayed in Appendix A.

Coding Procedure

A detailed code sheet was used to extract information relevant to the present review in the following categories: (a) research design, (b) implementer, (c) participants, (d) setting, (e) independent variable, and (f) dependent variables. Randomized controlled trials, quasi-experimental designs, and single-case designs were eligible for inclusion. Implementers included members of research teams, special education teachers, general education teachers, and hired interventionists. Additionally, several programs were delivered via computer. Participant demographic data was coded according to grade level, multilingual status, disability status, and at-risk status. Information coded for independent variables included name, description, whether a curriculum was used, whether it was researcher developed, the unit of delivery, duration, intensity, and fidelity. Finally, information coded for reading comprehension-related dependent variables included name, description, and effects.

Analysis

In addition to the data recorded in the code sheet, information was extracted detailing the individual instructional components included in each intervention (see Appendix B) as well as the instructional tier represented within each study design (see Appendices C, D, and E). Study findings are analyzed and reported in the following section according to their effects, instructional tier, intervention components, and the student population represented.

Results

Characteristics of Reviewed Studies

The first research question addresses the intervention and student characteristics that have been tested as part of adolescent reading comprehension interventions. The present review includes 62 studies reported in 60 peer-reviewed articles. These included 24,373 participants in fourth through ninth grades. Although multiple studies lacked complete demographic information, 2,911 emergent bilingual (EB) participants (11.9%) and 2,569 students with disabilities (SWD; 10.5%) were reported. Three experimental research designs were included: 23% quasi-experimental designs (QED; *n* = 14), 27% single-case designs (SCD; *n* = 17), and 50% randomized control trials (RCT; n = 31). Twenty-nine of the interventions (47%) were delivered as part of Tier 1 instruction, sixteen were delivered in Tier 2 (26%), and seventeen were part of Tier 3 intervention (27%). In terms of participants, 91% (*n* = 22,201) were included in Tier 1 studies, 7.6% (*n* = 1,843) were included in Tier 2 studies, and 1.3% (*n* = 329) were included in Tier 3 studies.

Independent Variables: Components of Interventions

The studies included in the present review leveraged an array of instructional components to impact reading comprehension outcomes for adolescent learners. Thus, a substantial degree of heterogeneity exists among the independent variables represented. In the following sections, intervention components will be described across three broad categories: (a) comprehension components, (b) vocabulary/fluency/writing components, and (c) instructional techniques.

Comprehension Components

In this analysis, comprehension components included the genre of the intervention materials and the strategies included in the intervention. Expository texts made up the majority of instructional materials (81% of studies, *n* = 50), with narrative texts used in 27% of studies (*n* = 17; several studies used both expository and narrative texts). Main idea (42%, *n* = 26), summarization (37%, *n* = 23), activating background knowledge (32%, *n* = 20), using graphic organizers, (24%, *n* = 15), and making inferences (21%, *n* = 13) were the most frequently utilized comprehension strategies in the reviewed studies. Additional comprehension strategies included text structure (18%, *n* = 11), retelling (15%, *n* = 9), and making connections (15%, *n* = 9).

Vocabulary/Fluency/Writing Components

Although all the reviewed studies measured and aimed to improve reading comprehension outcomes, many (58%, *n* = 36) included components from other areas (e.g., vocabulary, fluency, writing) and several (10%, *n* = 6) did not teach comprehension-specific strategies at all. The contributions of vocabulary instruction (e.g., Lawrence et al., 2019; Wright & Cervetti, 2017), fluency instruction (e.g., Stevens et al., 2017; Therrien, 2004), and writing instruction (e.g., Graham & Hebert, 2011; Hebert et al., 2013) to reading comprehension outcomes have been studied extensively. In the present review, vocabulary components included explicit vocabulary instruction (35%, *n* = 22) and embedded academic vocabulary (23%, *n* = 14). Reading fluency and writing components appeared in these studies in the forms of repeated reading (18%, *n* = 11) and writing about the text after reading (11%, *n* = 7).

Instructional Techniques

In 68% of studies (*n* = 42) it was noted that comprehension strategies were explicitly taught. Five additional instructional techniques were reported across multiple studies. The most frequently cited technique was the use of corrective feedback (44%, *n* = 27) to ensure participants practiced skills correctly. Technology was utilized (21%, *n* = 13) both as the primary mechanism for intervention delivery and as a tool to facilitate portions of the instruction. Social-emotional and motivational supports (19%, *n* = 12), visual supports (15%, *n* = 9) and enhancements for EB participants (11%, *n* = 7) were also embedded in instructional designs.

Dependent Variables and Effects

The second research question focused on the effectiveness of reading comprehension instruction in improving adolescent reading outcomes. Across the 62 studies included in the present review, statistically significant effects of treatment on reading comprehension outcomes were reported in 56% of studies (*n* = 35). Of those 35 studies, 60% (*n* = 21) reported significant positive effects on researcher-developed measures, and 46% (*n* = 16) reported significant positive effects on standardized measures. Group design studies accounted for 77% (*n* = 27) of reported positive reading comprehension outcomes, and SCD studies made up the remaining 23% (*n* = 8).

Effective Tier 1 Instructional Strategies

Of the 29 Tier 1 intervention studies included in the present review, 16 (55%) demonstrated statistically significant positive results on at least one dependent variable. In half of these studies (n = 8) reading strategy instruction was delivered in science or social studies classes (Boardman et al., 2015; Burns et al., 2024; Goldman et al., 2019; Gutierrez de Blume et al., 2020; Preast et al., 2019; Swanson et al., 2017; Vaughn et al., 2015; Vaughn et al., 2017). Strategies included: (a) explicit vocabulary instruction, (b) collaborative strategic reading (CSR), (c) partner reading, (d) paragraph shrinking, (e) finding the main idea, and (f) summarizing. Three of the Tier 1 studies utilized web-based delivery of instruction (Syal & Nietfeld, 2024; Wijekumar et al., 2017; Wijekumar et al., 2025). Whereas Syal and Nietfeld (2024) implemented a game-based learning environment to support comprehension of science texts, Wijekumar et al. (2017, 2025) used a web-based intelligent tutoring system to teach participants to use text structure. The remaining Tier 1 studies implemented Readable English (Coggins, 2023), writing during reading (Collins et al., 2017), motivation strategies (Farkas & Jang, 2019), prereading prompts (Fogarty et al., 2016), knowledge activation (Hattan & Alexander, 2021), and an SRSD strategy with Quality Talk (Li et al., 2016).

Effective Tier 2 Instructional Strategies

Of the 16 Tier 2 intervention studies, 11 (69%) demonstrated statistically significant positive results on at least one dependent variable. In these studies, participants received supplemental intervention in smaller groups in addition to their regular reading instruction. There was substantial heterogeneity in the independent variables tested. Three studies showed positive outcomes from multicomponent reading programs on comprehension measures (Ritchey et al., 2017; Stevens et al., 2019; Wanzek et al., 2017). Several studies demonstrated the effectiveness of explicit reading comprehension interventions across divers instructional contexts. For example, both Barnes et al. (2024) and Hall et al. (2020) found that tutor-led inference or teacher-led explicit inference-generation instruction significantly outperformed computer-delivered programs, such as the Accelerated Reader program. Similarly, Reed and Lynn (2016) reported that inference instruction combined with group goal setting was more effective than inference instruction with or without individual goal setting. Fite et al. (2021) showed that combining repeated readings with a preview-review strategy, which included a cold read of the passage in Spanish, was more effective than repeated readings alone for improving the reading comprehension rate of three students identified as EB. Instruction focused on critical analysis also showed promise; Haria and Midgette (2015) found that students performed significantly better on a comprehension measure after receiving instruction

in analyzing argumentative texts. Writing-based interventions also proved effective: Hebert et al. (2014) found that participants who received one of two treatments incorporating writing significantly outperformed those in a reading-only group on a researcher-developed measure of reading comprehension, and Hebert et al. (2018) reported positive effects of text-structure intervention on students' ability to identify text structure. Finally, Wasburn et al. (2021) demonstrated that explicit instruction in a paraphrasing strategy resulted in medium effects for 67% of participants (*n* = 4) and large effects for 33% of participants (*n* = 2).

Effective Tier 3 Instructional Strategies

Of the 16 Tier 3 intervention studies, six (38%) demonstrated statistically significant positive results on at least one dependent variable. Again, there was substantial heterogeneity in the independent variables tested. Two studies (Howorth et al., 2016; Sanders, 2021) examined SRSD reading comprehension strategies (TWA and TRAP, respectively) with PND ranging from 83% to 100%. Barth and Elleman (2017) found significant treatment effects for multi-strategy inference instruction compared to business-as-usual (BAU) reading remediation classes. Cullen and colleagues (2014) tested a computer program which taught comprehension question types and showed significantly positive effects over baseline on Maze probes. Head et al. (2018) investigated the Corrective Reading Comprehension program, which also significantly improved Maze scores over baseline. Finally, Schmitt et al. (2019) compared a continuous text to speech (TTS) condition (Kurzweil 3000) to a discontinuous TTS condition (Read Pen) and found large effects favoring continuous TTS over the discontinuous and baseline conditions on a measure of comprehension rate.

What Works for Emergent Bilingual Students

Overall, there was a lack of consistency in reporting language status of participants across studies. Of the 35 studies demonstrating positive comprehension outcomes, 49% (*n* = 17) did not report language status, 17% (*n* = 6) included no EB participants, 20% (*n* = 7) included under 50% EB participants, and 14% (*n* = 5) included at least 50% EB participants. The components that appeared most frequently in studies with positive outcomes and at least 50% EB participants were activating background knowledge 80% (*n* = 5), identifying main idea 60% (*n* = 3), explicit comprehension strategy instruction 60% (*n* = 3), and use of corrective feedback 60% (*n* = 3).

What Works for Students with Disabilities

Similar to reporting of EB students, there was also a lack of consistency in the reporting of disability status among participants across studies. Of the 35 studies demonstrating positive comprehension outcomes, 23% (*n* = 8) did not report disability status, 17% (*n* = 6) included no SWDs, 37% (*n* = 13) included under 50% SWDs, and 23% (*n* = 8) included at least 50% SWDs. The components that appeared most frequently in studies with positive outcomes and at least 50% SWDs were explicit vocabulary instruction 50% (*n* = 4), identifying main idea 63% (*n* = 5), and explicit instruction of comprehension strategies 63% (*n* = 5).

Features of Effective Interventions

The final research question concerned the features of interventions associated with improved adolescent reading comprehension outcomes. Four instructional components and two instructional techniques appeared frequently across studies that demonstrated significant treatment effects. Main idea instruction was a component of 51% (*n* = 18) of studies, followed by summarization (34%, *n* = 12), explicit vocabulary instruction (31%, *n* = 11), and activating background knowledge (29%, *n* = 10). The factor most associated with studies demonstrating positive reading comprehension outcomes was explicit instruction of comprehension strategies (74%, *n* = 26). Delivering corrective feedback was also substantially associated with positive outcomes (43%, *n* = 15).

Discussion

This systematic review aimed to build upon the WWC Practice Guide recommendation (Kamil et al., 2008) to provide adolescents with direct and explicit reading comprehension instruction by synthesizing the adolescent reading comprehension intervention literature published since 2014. Based on a review of the literature, it appears no previous reviews or meta-analyses have focused specifically on reading comprehension interventions and outcomes for students in grades four through nine published in the past decade.

Three research questions guided the present review:

1. What instructional and intervention characteristics and student characteristics have been tested as part of reading comprehension interventions?
2. What does the research say about the effectiveness of reading comprehension instruction in improving adolescent reading outcomes for readers in grades four through nine?
3. What features of instructional interventions (e.g., type of instruction, duration, grade level) are associated with improved outcomes, and do these features differ according to student characteristics?

A search of four databases and a systematic eligibility screening process yielded 60 peer-reviewed articles reporting on 62 studies. Group design studies accounted for 73% of the study sample, and SCD studies made up the remaining 27%. The reviewed studies included 24,373 participants, of whom 11.9% were reported to be EB students and 10.5% were reported to be students with disabilities.

Previous meta-analyses (e.g., Filderman et al, 2022; Hall-Mills & Marante, 2022; Sohn et al., 2023) found medium to large effect sizes on comprehension outcomes for interventions delivered to students with reading difficulties. As noted by Kamil et al. (2008) however, although effective instructional strategies have been identified, it is not possible to compare the strategies to each other. Peng et al. (2023) agreed with this idea in their investigation of the effectiveness of various reading comprehension strategy combinations. They identified that strategy effectiveness relied on activating background knowledge and that combining main idea, text structure, and retell strategies appeared more effective than other combinations, but they explicitly noted that no one strategy worked best at improving reading comprehension. Therefore, the present review identified strategies and instructional techniques that have been studied and pinpointed those that appeared with greatest frequency in the studies that demonstrated positive outcomes on comprehension measures but did not attempt to make comparisons or judgments about their effectiveness.

The comprehension-specific strategies in the reviewed studies included: (a) identifying main idea, (b) summarizing, (c) activating background knowledge, (d) using graphic organizers, (e) making inferences, (f) using text structure, (g) retelling, and (h) making connections. Strategies that did not specifically focus on comprehension included explicit vocabulary instruction, repeated readings, and writing about the text. Of these, the strategies that most frequently appeared in studies demonstrating positive effects on comprehension were identifying main idea, summarizing, explicit vocabulary instruction, and activating background knowledge. The main instructional techniques described in the reviewed studies included: (a) explicit instruction of comprehension strategies, (b) corrective feedback, (c) use of technology, (d) social-emotional and motivational supports, (e) visual supports, and (f) enhancements for EB students. The two techniques appearing most frequently in studies demonstrating positive effects on comprehension were explicit instruction of comprehension strategies and the use of corrective feedback to ensure proper practice. At Tier 2 and Tier 3, it was not possible to identify common instructional design practices that appeared to be especially impactful. However, at Tier 1, 50% of studies with positive reading comprehension outcomes embedded literacy instruction in the content areas and utilized science and social studies texts to develop comprehension skills.

A lack of consistency in reporting demographic information across studies makes it challenging to identify instructional components that may be important for EB students and those with disabilities. Of the studies that demonstrated positive comprehension outcomes, 49% did not report language status of participants and 23% did not report disability status. Of the 14% of studies that included at least 50% EB participants, the components that appeared most frequently were activating background knowledge, identifying main idea, explicit comprehension strategy instruction, and use of corrective feedback. Of the 23% of studies that included at least 50% SWD, the components that appeared most frequently were explicit vocabulary instruction, identifying main idea, and explicit comprehension strategy instruction.

Implications for Practice

This review identified one instructional design practice, two instructional techniques, and three reading comprehension components that may be advantageous for educators to consider as they design interventions to address the reading comprehension needs of adolescent learners. First, embedding reading instruction in the content areas and teaching expository comprehension strategies with science and social studies texts appears to be a valuable instructional design practice. Next, explicit instruction of reading comprehension strategies and consistent delivery of

corrective feedback may be critical techniques for maximizing the impact of instruction on reading outcomes. Finally, when selecting comprehension strategies, activating background knowledge, identifying the main idea, and summarizing were present in studies that demonstrated positive results regardless of the tier at which they were delivered or the population targeted by the intervention, suggesting their powerful benefits in supporting adolescent reading comprehension.

Limitations

There are three primary limitations that emerged from this review. First, this review did not consider study quality. Therefore, the results of the individual studies should not necessarily be understood to represent equivalent demonstrations of efficacy or to have comparable reliability, validity, or generalizability. Next, because this review primarily reported the frequency with which various components of reading comprehension instruction appeared across studies, there may be important intervention components that appeared infrequently simply because they have not been included in multiple studies. It will be important to continue to expand the knowledge base regarding what works, for whom, and under what conditions when it comes to improving adolescent reading comprehension outcomes. Finally, nearly half of the reviewed studies did not include language status, and about a quarter did not report disability or special education status. Therefore, findings related to participants who are EB or SWDs should be interpreted very cautiously.

Future Research

To better understand which practices are most important for particular populations (in the case of this review, students who are EB and/or SWDs), it is important that future reading research address the specific strengths and needs unique to these groups. Additionally, there is an opportunity for future research, including mixed groups, to report all relevant demographic information. Different groups of students are uniquely affected by public policy, education policy, instructional practices, and school-based academic and behavioral expectations. To apply research- and evidence-based practices that promote equitable outcomes for historically marginalized learners, it is important to examine how these learners have, and have not been, represented in research and to understand the outcomes specific to their experiences.

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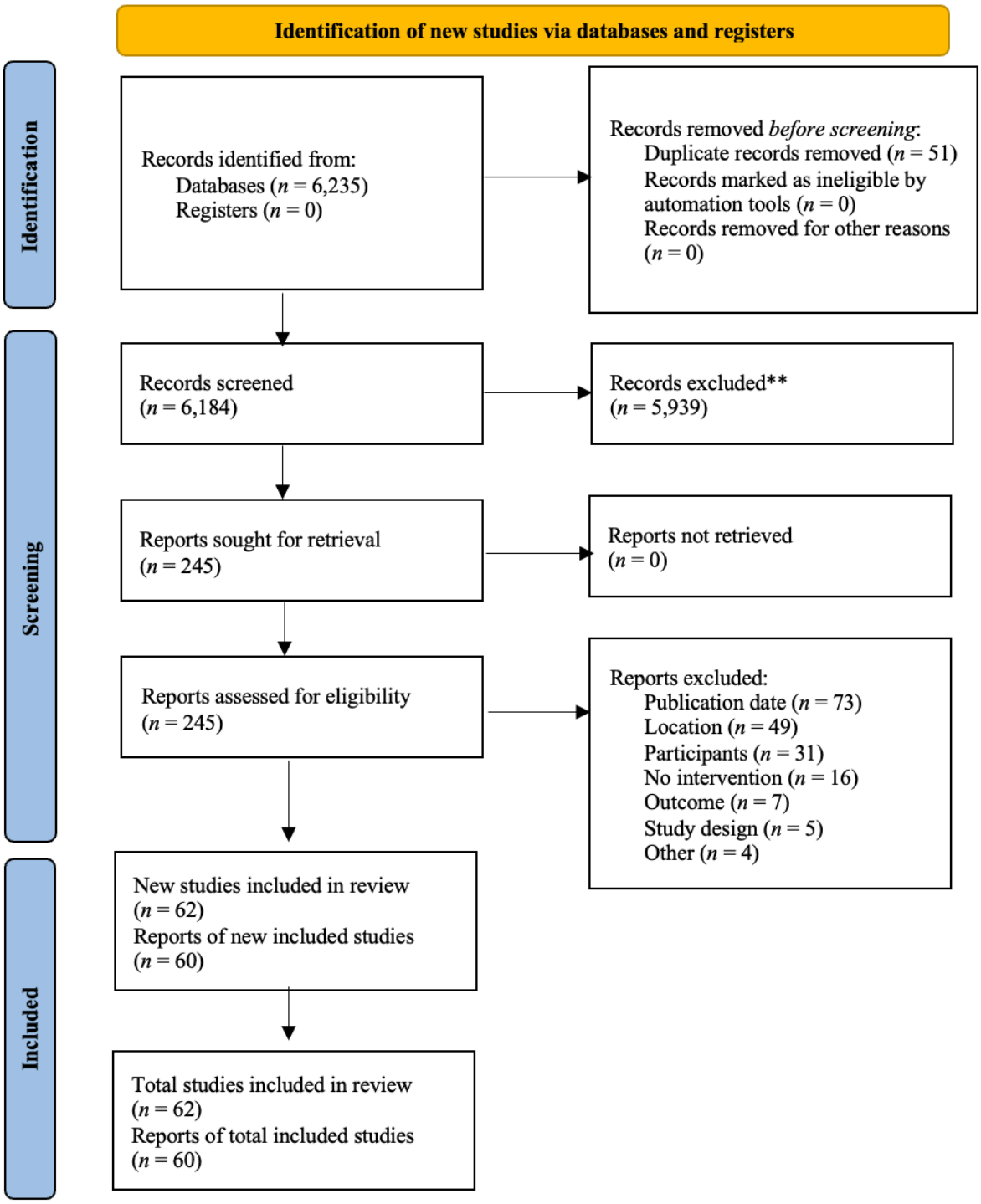
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Appendix A

PRISMA diagram



Appendix B

Overview of Studies and Demographics

Study	Design	Students	Implementer	Dosage	RC?	Name of Program
Al Otaiba et al., 2023	RCT	*N* = 59 100% 4th grade (*n* = 59) 51% EB (*n* = 30); 12% SWD (*n* = 5)	Hired interventionist	1–78 sessions, 30 to 60 minutes each	Researcher created mindset training added to an existing program	Lindamood Phoneme Sequencing Program (LiPS; Lindamood & Lindamood, 2011)
Alqahtani, 2021	SCD	*N* = 2 100% 4th grade (*n* = 2) EB NR SWD NR	Teacher	~24 sessions, ~20 minutes each (~8 hours)	No	Reread-Adapt and Answer-Comprehend (RAAC; Therrien et al., 2004)
Ardasheva et al., 2018	RCT	*N* = 174 100% 7th grade (*n* = 174) 49% EB *(n* = 86) SWD NR	Teacher	2 class periods	Yes	Science Vocabulary Support (SVS) Program
Barber et al., 2014	QED	*N* = 771 66% 6th grade (*n* = 511) 34% 7th grade (*n* = 260) EB 50% (*n* = 387) SWD NR	Teacher	7 weeks	Yes	United States History for Engaged Reading (USHER)
Barnes et al., 2024	RCT	*N* = 145 6th - 8th grade 14% EB (*n* = 21) 7% SWD (*n* = 10)	Hired interventionist	26 lessons	Yes	Connecting Text through Inference and Technology (Connect-IT)
Barth & Elleman, 2017	RCT	*N* = 66 24% 6th grade (*n* = 16) 38% 7th grade (*n* = 25) 38% 8th grade (*n* = 25) 0% EB 30% SWD (*n* = 20)	Hired interventionist	10 sessions, 45 minutes each (~7.5 hours)	Yes	N/A
Barth et al., 2016	RCT	*N* = 134 38% 6th grade (*n* = 51) 41% 7th grade (*n* = 55) 21% 8th grade (*n* = 28) EB NR 31% SWD (*n* = 42)	Hired interventionist	32 sessions, 40 minutes each (~21 hours)	Yes	N/A
Boardman et al., 2015	RCT	*N* = 1,074 6th-8th grade 51% EB (*n* = 545) 11% SWD (*n* = 122)	Teacher	16-34 hours	No	N/A
Burns et al., 2024	RCT	*N* = 86 100% 8th grade (*n* = 86) 42% EB (*n* = 36) 17% SWD (*n* = 15)	Teacher	15 sessions, 20 minutes each (5 hours)	No	N/A
Capin et al., 2024	RCT	*N* = 340 46% 6th grade (*n* = 157)	Hired interventionist	45-50 minutes per day for two school years	Yes	Reading Intervention for Students who are Emergent

Study	Design	Students	Implementer	Dosage	RC?	Name of Program
		54% 7th grade (*n* = 183) 100% EB (*n* = 340) 15% SWD (*n* = 51)				Bilinguals with Reading Difficulties (RISE)
Coggins, 2023	QED	*N* = 344 6th-8th grade 0% EB (*n* = 0) 29% SWD (*n* = 100)	Teacher	~63 hours	No	Readable English
Coleman et al., 2018	RCT	*N* = 213 100% 4th grade (*n* = 213) EB NR SWD NR	Teacher	30-45 minutes	Yes	N/A
Collins et al., 2017	RCT	*N* = 1,062 47% 4th grade (*n* = 502) 53% 5th grade (*n* = 560) EB NR 19% SWD (*n* = 202)	Teacher	90 minutes per day for one to two school years	Yes	Writing Intensive Reading Comprehension (WIRC)
Cullen et al., 2014	SCD	*N* = 6 17% 3rd grade (*n* = 1) 83% 5th grade (*n* = 5) EB NR 100% SWD (*n* = 6)	Teacher, Tech	8-15 sessions, 15-30 minutes each	No	Headsprout Comprehensive Computer Program
de Blume et al., 2020	QED	*N* = 124 100% 8th grade (*n* = 124) EB NR 0% SWD (*n* = 0)	Teacher	Two school years	Yes	N/A
Denton et al., 2017	QED	*N* = 48 100% 9th grade (*n* = 48) EB NR 6% SWD (*n* = 3)	Researcher	9 sessions, 40 minutes each	Yes	N/A
Drill & Bellini, 2021	SCD	*N* = 3 33.3% 6th grade (*n* = 1) 33.3% 7th grade (*n* = 1) 33.3% 8th grade (*n* = 1) 0% EB (n = 0) 100% SWD (*n* = 3)	Researcher	24-26 sessions, 30-60 minutes each	Yes	N/A
Farkas & Jang, 2019	QED	*N* = 62 100% 8th grade (*n* = 62) 0% EB (*n* = 0) 0% SWD (*n* = 0)	Teacher	60 sessions, 70 minutes each	Yes	N/A
Fite et al., 2021	SCD	*N* = 3 Ages 12-14 100% EB 0% SWD	Researcher	21 sessions	Yes	Preview-Review
Fogarty et al., 2016	QED	*N* = 32 100% 8th grade (*n* = 32) 6% EB (*n* = 2) 6% SWD (*n* = 2)	Researcher	30 minutes	Yes	N/A
Goldman et al., 2019	RCT	*N* = 982 100% 9th grade	Teacher	20-22 weeks	Yes	Project READI

Study	Design	Students	Implementer	Dosage	RC?	Name of Program
		EB NR SWD NR				
Goodwin, 2015	RCT	*N* = 203 58% 5th grade (*n* = 117) 42% 6th grade (*n* = 86) 37% EB (*n* = 74) 7% SWD (*n* = 15)	Researcher	4 sessions, 30 minutes each	Yes	N/A
Hall et al., 2020	RCT	*N* = 78 6th - 7th grade 77% EB (*n* = 60) 12% SWD (*n* = 9)	Researcher, Hired interventionist	24 sessions, 40 minutes each	Yes	N/A
Haria & Midgette, 2015	SCD	*N* = 7 100% 5th grade (*n* = 7) EB NR SWD NR	Researcher	24-26 sessions, 45 minutes each	Yes	Critical analysis of argumentative text (CAAT)
Hattan & Alexander, 2021	RCT	*N* = 149 52% 5th grade (*n* = 78) 48% 6th grade (*n* = 71) 0% EB (*n* = 0) 0% SWD (*n* = 0)	Researcher	2 sessions, 1 hour each	Yes	N/A
Hawkins et al., 2015	SCD	*N* = 4 100% 4th grade (*n* = 4) EB NR SWD NR	Researcher	12 weeks, 1-2 sessions per week, 5-21 minutes per session	Yes	(**T1**) Repeated Reading (**T2**) Reading-While Listening
Head et al., 2018	SCD	*N* = 3 33.3% 5th grade (*n* = 1) 33.3% 8th grade (*n* = 1) 33.3% 9th grade (*n* = 1) 0% EB (*n* = 0) 100% SWD (*n* = 3)	Researcher	approximately 6 weeks, daily lessons, 30 minutes each	No	Corrective Reading Comprehension: B1
Hebert et al., 2018	RCT	*N* = 45 38% 4th grade (*n* = 17) 62% 5th grade (*n* = 28) EB NR SWD NR	Teacher	Eight structured lessons, 25-30 minutes each	Yes	Structures Comprehension Intervention
Hebert et al., 2016	RCT	*N* = 192 100% 4th grade (*n* = 192) EB NR 14% SWD (*n* = 26)	Researcher	Three sessions, 45 minutes each + one 60-minute session	Yes	Reading and Studying vs Notetaking vs Extended Writing
Howorth et al., 2016	SCD	*N* = 4 50% 5th grade (*n* = 2) 50% 6th grade (*n* = 2) EB NR 100% SWD (*n* = 4)	Researcher	Six sessions, 45 minutes each	No	Think before reading, think While reading, think After Reading (TWA)
Kouo & Visco, 2021	SCD	*N* = 2 100% 7th grade (*n* = 2) EB NR 100% SWD (*n* = 2)	Teacher	75 sessions, 20 minutes each	Yes	Technology-Aided Instruction and Intervention: Inferences

Study	Design	Students	Implementer	Dosage	RC?	Name of Program
Li et al., 2016	SCD	*N* = 63 46% 3rd grade (*n* = 29) 54% 4th grade (*n* = 34) EB NR SWD NR	Teacher	18 weeks, 10 hours per week	No	Think before reading, think While reading, think After Reading (TWA); Quality Talk (QT)
Lovett et al., 2021	RCT	*N* = 514 31% 6th grade (*n* = 160) 40% 7th grade (*n* = 203) 29% 8th grade (*n* = 151) 0% EB (*n* = 0) 100% SWD (*n* = 514)	Teacher	40-60 minutes, 3-5 times per week, 100-125 hours total	Yes	PHAST + Fluency Focus PHAST + Comprehension Focus
Marshall & Myers, 2021	SCD	*N* = 2 100% 9th grade (*n* = 2) EB NR 100% SWD (*n* = 2)	Researcher	5 sessions	Yes	Restricted Interests (RI) Within Passages Embedding
Murphy et al., 2023	QED	*N* = 288 4th-5th grade EB NR SWD NR	Teacher	ELA lessons over an entire school year	No	Quality Talk (QT)
Preast et al., 2019	QED	*N* = 126 52% 4th grade (*n* = 65) 48% 6th grade (*n* = 61) EB NR 0% SWD (*n* = 0)	Teacher	15 sessions, 15-20 minutes each	Yes	N/A
Ramsay & Sperling, 2015 (Study 1)	QED	N = 146 49% 5th grade (n = 72) 51% 6th grade (n = 74) NR SWD NR EB	Researcher	60-90 minutes	Yes	N/A
Ramsay & Sperling, 2015 (Study 2)	QED	N = 83 100% 8th grade NR SWD NR EB	Researcher	90-120 minutes	Yes	N/A
Reed & Lynn, 2016	QED	N = 24 4% = 5th grade (n=1) 70% = 6th grade (n=17) 16% = 7th grade (n=4) 8% = 8th grade (n=2) 79% = SWD (n=19) EB NR	Researcher	One session at 30-40 minutes. Six sessions at 3-5 minutes each.	Yes	N/A
Ritchey et al., 2017	RCT	N = 46 100% 5th grade (n= 46) 6.5% SWD (n = 3) 6.5% EB (n = 3)	Researcher	40-44 sessions, 30 minutes each	Yes	N/A
Roberts et al., 2023	RCT	*N* = 7,183 100% 8th grade (*n* = 7,183)	Teacher	Program can be completed in 6 weeks at 3 hours	Yes	Promoting Adolescents' Comprehension of Text (PACT)

Study	Design	Students	Implementer	Dosage	RC?	Name of Program
		8% EB (*n* = 575) 12% SWD (*n* = 862)		per week, but actual dosage was NR		
Rouse et al., 2014	SCD	*N* = 2 100% 5th grade (*n* =2) 50% EB (*n* =1) 100% SWD *(n* =2)	Researcher	31 sessions, 30 minutes each	Yes	N/A
Sanders, 2021	SCD	*N* = 4 50% 5th grade (*n* = 2) 50% 6th grade (*n* = 2) EB NR 100% SWD (*n* = 4)	Researcher	The six lessons were conducted over a 40–60-min	Yes	TRAP reading strategy (SRSD)
Sanders et al., 2019	RCT	*N* = 30 33% = 4th grade (*n* = 10) 50% = 5th grade (n=15) 17% = 6th grade (*n* = 5) EB NR 79% = SWD (*n* = 10)	Researcher	Lessons were completed over the course of 11 days	No	SRSD reading strategy - TWA: Think Before Reading, Think While Reading, Think After Reading
Schmitt et al., 2019	SCD	*N* = 4 100% 8th grade (*n* =4) EB NR 100% SWD *(n* =4)	Researcher	10 sessions, 20 minutes each	No	Kurzweil 3000 and ReadingPen
Scott & Dreher, 2021	QED	*N* = 205 100% 6th grade EB NR SWD NR	Teacher	47 sessions, 40 minutes each	Yes	N/A
Solís et al., 2021 (Study 1)	SCD	*N* = 3 100% 4th grade (*n* = 3) EB NR 100% SWD (*n = 3)*	Hired interventionist	19-26 sessions, 30-40 minutes each	Yes	N/A
Solís et al., 2021 (Study 2)	SCD	*N* = 4 100% 4th grade (*n* = 4) EB NR 100% SWD (*n = 4)*	Teacher	19-26 sessions, 30-40 minutes each	Yes	N/A
Solis et al., 2015	RCT	*N* = 44 100% 9th grade (*n* = 44) 39% EB (*n* = 17) 27% SWD (*n* = 12)	Hired interventionist	80 sessions, 90 minutes each	Yes	N/A
Solís et al., 2018	RCT	*N* = 91 100% 9th grade (*n* = 91) 25% EB (*n* = 23) 15% SWD (*n* = 14)	Hired interventionist	Average dosage = 114 hours	Yes	N/A
Stevens et al., 2019	RCT	*N* = 62 45% 4th grade (*n* = 28) 55% 6th grade (*n* = 34) 63% EB (*n* = 39) 3% SWD (*n* = 2)	Hired interventionist	25 lessons, 45 minutes each	Yes	N/A
Strong, 2023	RCT	*N* = 351 46% 4th grade (*n* = 160)	Teacher	16 lessons, 60 minutes each	Yes	N/A

Study	Design	Students	Implementer	Dosage	RC?	Name of Program
		54% 5th grade (*n* = 191) SWD NR EB NR				
Sukhram & Monda-Amaya, 2017	QED	*N* = 60 100% 7th grade (*n* = 60) EB NR 60% SWD (*n* = 36)	Researcher	Average dosage = 39 minutes (range: 32-50 minutes)	Yes	N/A
Swanson et al., 2017	RCT	*N* = 78 100% 8th grade (*n* = 78) 24% EB (*n* = 19) 12% SWD (*n* = 9)	Teacher	11 units, 8-15 sessions each, taught in 45-minute class periods	Yes	Promoting Adolescents' Comprehension of Text (PACT)
Syal & Nietfeld, 2024	QED	*N* = 234 100% 5th grade (*n* = 234) SWD NR EB NR	Tech	12 sessions, 45 minutes each	No	Missions with Monty
Vaughn et al., 2017	RCT	*N* = 1,629 100% 8th grade (*n* = 1,629) 27% EB (*n* = 435) 10% SWD (*n* = 160)	Teacher	225 minutes per week for 8 weeks, then 45 minutes per week for 12 weeks (~39 hours)	Yes	Promoting Adolescents' Comprehension of Text (PACT)
Vaughn et al., 2015	RCT	*N* = 1,487 100% 8th grade (*n* = 1,487) 5% EB (*n* = 71) 8% SWD (*n* = 117)	Teacher	30 sessions, 50 minutes each	Yes	Promoting Adolescents' Comprehension of Text (PACT)
Wanzek et al., 2017	RCT	*N* = 450 100% 4th grade (*n* = 450) 13% EB (*n* = 59) 15% SWD (*n* = 68)	Hired interventionist	120 sessions, 30 minutes each	No	Passport to Literacy
Washburn et al., 2021	SCD	*N* = 6 100% 4th grade (*n* = 6) 0% EB (*n* = 0) 0% SWD (*n* = 0)	Teacher	15 sessions, 30 minutes each	No	TRAP paraphrasing strategy
Wijekumar et al., 2025	RCT	*N* = 2,170 100% 5th grade (*n* = 2,170) EB NR SWD NR	Teacher, Tech	ITSS for 45 minutes weekly for six months, KAT 15-30 minutes daily	No	Intelligent tutor for structure strategy (ITSS) and Knowledge acquisition and transformation (KAT)
Wijekumar et al., 2017	RCT	*N* = 2,489 100% 5th grade (*n* = 2,489) EB NR SWD NR	Tech	30-45 minutes weekly for 6-7 months	No	Intelligent Tutoring System for the Text Structure Strategy (ITSS)
Williams & Vaughn, 2020	RCT	*N* = 85 100% 9th grade 100% EB 100% SWD	Hired interventionist	3.75-4.25 hours per week for one school year	Yes	The intervention included use of the REWARDS Secondary program and Collaborative Strategic Reading

Note. EB = emergent bilingual (described by study authors as EB, EL, ELL, or LEP); NR = not reported; QED = quasi-experimental design; RC = researcher created; RCT = randomized control trial; SCD = single-case design; SWD = students with disabilities

Appendix C

Instructional Components

Study	EVI	AV	ABK	TSI	Sum	MC	GO	MI	Inf	Ret	Exp	Narr	RR	Writ	Strat	CF	Tech	VI	EB	SE
Al Otaiba et al., 2023								Yes								Yes	Yes			Yes
Alqahtani, 2021										Yes		Yes	Yes			Yes	Yes			
Ardasheva et al., 2018	Yes	Yes									Yes							Yes		
Barber et al., 2014	Yes	Yes	Yes				Yes				Yes					Yes				
Barnes et al., 2024									Yes		Yes	Yes				Yes	Yes	Yes		Yes
Barth & Elleman, 2017			Yes			Yes			Yes		Yes	Yes			Yes	Yes				
Barth et al., 2016								Yes	Yes		Yes				Yes	Yes				
Boardman et al., 2015			Yes					Yes			Yes				Yes	Yes				
Burns et al., 2024								Yes			Yes		Yes			Yes				
Capin et al., 2024			Yes		Yes		Yes	Yes	Yes		Yes		Yes		Yes	Yes		Yes	Yes	
Coggins, 2023															Yes		Yes			
Coleman et al., 2018											Yes							Yes		
Collins et al., 2017					Yes		Yes				Yes	Yes		Yes	Yes				Yes	
Cullen et al., 2014	Yes							Yes	Yes		Yes	Yes				Yes	Yes			Yes
de Blume et al., 2020	Yes	Yes					Yes				Yes				Yes					
Denton et al., 2017			Yes		Yes		Yes		Yes			Yes			Yes	Yes				Yes
Drill & Bellini, 2021							Yes					Yes	Yes		Yes					Yes
Farkas & Jang, 2019											Yes	Yes		Yes	Yes					Yes
Fite et al., 2021	Yes	Yes	Yes					Yes		Yes	Yes		Yes			Yes	Yes			
Fogarty et al., 2016			Yes			Yes						Yes								
Goldman et al., 2019		Yes									Yes									
Goodwin, 2015	Yes					Yes	Yes	Yes			Yes	Yes								Yes

Study	EVI	AV	ABK	TSI	Sum	MC	GO	MI	Inf	Ret	Exp	Narr	RR	Writ	Strat	CF	Tech	VI	EB	SE
Hall et al., 2020							Yes		Yes			Yes			Yes					
Haria & Midgette, 2015				Yes				Yes			Yes				Yes					
Hattan & Alexander, 2021			Yes		Yes	Yes	Yes				Yes				Yes	Yes				
Hawkins et al., 2015													Yes			Yes	Yes			Yes
Head et al., 2018	Yes														Yes	Yes				
Hebert et al., 2018				Yes						Yes	Yes				Yes					
Hebert et al., 2014								Yes			Yes			Yes						
Howorth et al., 2016	Yes				Yes			Yes		Yes	Yes				Yes					
Kouo & Visco, 2021							Yes										Yes	Yes		
Li et al., 2016	Yes			Yes	Yes	Yes		Yes		Yes	Yes				Yes					
Lovett et al., 2021	Yes		Yes	Yes	Yes								Yes		Yes					Yes
Marshall & Myers, 2021											Yes	Yes								Yes
Murphy et al., 2023	Yes					Yes					Yes			Yes	Yes					
Preast et al., 2019								Yes			Yes		Yes		Yes	Yes				
Ramsay & Sperling, 2015 (Study 1)			Yes								Yes									
Ramsay & Sperling, 2015 (Study 2)			Yes								Yes									
Reed & Lynn, 2016							Yes		Yes		Yes	Yes			Yes					Yes
Ritchey et al., 2017					Yes	Yes		Yes			Yes				Yes					
Roberts et al., 2023	Yes	Yes	Yes		Yes						Yes				Yes	Yes				
Rouse et al., 2014											Yes				Yes	Yes				
Sanders, 2021				Yes				Yes		Yes	Yes				Yes			Yes		
Sanders et al., 2019	Yes	Yes			Yes			Yes		Yes	Yes				Yes					
Schmitt et al., 2019												Yes					Yes			

Study	EVI	AV	ABK	TSI	Sum	MC	GO	MI	Inf	Ret	Exp	Narr	RR	Writ	Strat	CF	Tech	VI	EB	SE
Scott & Dreher, 2021		Yes		Yes	Yes		Yes				Yes		Yes	Yes	Yes					
Solis et al., 2021 (Study 1)	Yes				Yes			Yes			Yes				Yes	Yes				
Solis et al., 2021 (Study 2)	Yes				Yes			Yes			Yes				Yes	Yes				
Solís et al., 2015	Yes	Yes	Yes		Yes				Yes		Yes				Yes					
Solís et al., 2018	Yes	Yes	Yes		Yes	Yes			Yes		Yes	Yes	Yes		Yes					
Stevens et al., 2019			Yes	Yes				Yes			Yes			Yes	Yes			Yes		
Strong, 2023				Yes	Yes		Yes	Yes			Yes			Yes	Yes			Yes		
Sukhram & Monda-Amaya, 2017											Yes	Yes	Yes			Yes				
Swanson et al., 2017	Yes	Yes	Yes		Yes						Yes				Yes	Yes				
Syal & Nietfeld, 2024					Yes			Yes			Yes				Yes	Yes	Yes	Yes		
Vaughn et al., 2017	Yes	Yes	Yes		Yes						Yes				Yes	Yes			Yes	
Vaughn et al., 2015	Yes	Yes	Yes		Yes						Yes				Yes	Yes				
Wanzek et al., 2017	Yes			Yes	Yes	Yes		Yes	Yes		Yes	Yes			Yes					
Washburn et al., 2021			Yes					Yes		Yes	Yes				Yes		Yes			
Wijekumar et al., 2025				Yes	Yes		Yes	Yes	Yes		Yes				Yes	Yes	Yes			
Wijekumar et al., 2017				Yes	Yes		Yes	Yes	Yes		Yes				Yes	Yes	Yes			
Williams & Vaughn, 2020	Yes	Yes	Yes				Yes	Yes		Yes	Yes				Yes				Yes	

Note. EVI = explicit vocabulary instruction; AV = academic vocabulary; Strat = explicit comprehension strategy instruction; ABK = activating background knowledge; TSI = text structure instruction; Sum = summarization; MC = making connections; GO = graphic organizers; MI = main idea / Gist; Inf = Inference instruction; Ret = retelling; Exp = expository texts; Narr = narrative texts; RR=repeated reading; Writ = writing about text; CF = corrective feedback; Tech = technology use; VI = visuals; EB = enhancements for emergent bilingual students; SE = social-emotional / motivational supports

Appendix D

Tier 1 Intervention Studies

Study and design	Participants	Intervention conditions as implemented in the study	Comparison condition as implemented in the study	Outcome domain and reported findings (comprehension only)	Dosage
Ardasheva et al., 2018 RCT	*N* = 174 100% 7th grade 49% EB *(n* = 86) SWD NR	Participants read two passages from a 7th grade physics text supported by labels verbally denoting what was being depicted in the text and visuals representing each label.	The control group read the same passages with labels but no visuals.	**Researcher-developed, multiple-choice comprehension questions**: No significant main effect $p = .261$	Two class periods
Barber et al., 2014 QED	*N* = 771 66% 6th grade, 34% 7th grade EB 50% (*n* = 387) SWD NR	Three strategies (activating background knowledge through text features, generating text-based questions, and organizing information graphically) were taught over three U.S. History units.	The comparison group received BAU social studies instruction with no specific literacy supports.	**GMRT-RC:** No statistically significant changes $p > 0.05$. Language status effect was significant $p < 0.001$ **Researcher-created, multiple-choice history comprehension measure**: Students increased from pre- to post-test $p < 0.001$. Language status effect was significant $p < 0.001$.	7 weeks
Boardman et al., 2015 RCT	*N* = 1,074 100% 6th-8th grade 51% EB (*n* = 545) 11% SWD (*n* = 122)	Participants received collaborative strategic reading (CSR) instruction in science and social studies classes. Strategies included: (1) setting purpose for reading, (2) monitoring comprehension and fixing it when it breaks down, (3) finding main idea, and (4) summarizing and answering questions.	BAU science and social studies instruction	**GMRT-RC**: Posttest means were higher for students who received Full CSR than for the students who received BAU instruction $p = 0.032$	16-34 hours
Burns et al., 2024 RCT	*N* = 86 100% 8th grade 42% EB (*n* = 36) 17% SWD (*n* = 15)	Participants engaged in partner reading and paragraph shrinking with science and social studies texts	Independent work time	**DIBELS 8 Maze**: Significant impacts on both science maze scores ($p < .01$) and social studies mazes cores ($p < .01$)	15 sessions, 20 minutes each (5 hours)
Capin et al., 2024	*N* = 340 46% 6th grade (*n* = 157) 54% 7th grade (*n* = 183) 100% EB (*n* = 340) 15% SWD (*n* = 51)	Participants received daily multicomponent intervention targeting word reading, text reading fluency, academic vocabulary, and reading comprehension.	BAU reading intervention class	**GMRT-RC**: No significant differences between treatment and BaU conditions at the spring of Year 1 ($p = .22$), fall of Year 2 ($p = .96$) and spring of Year 2 ($p = .34$).	45-50 minutes per day for two school years
Coggins, 2023 QED	*N* = 344 100% 6th-8th grade 0% EB (*n* = 0) 29% SWD (*n* = 100)	Participants received instruction using Readable English, a system that makes English words phonetic and provides explicit instruction in decoding and encoding with integrated fluency, comprehension, writing, and vocabulary practice.	BAU ELA (Amplify ELA)	**WRMT-3 PC:** Significant effect of treatment $p < 0.001$	~63 hours

Study and design	Participants	Intervention conditions as implemented in the study	Comparison condition as implemented in the study	Outcome domain and reported findings (comprehension only)	Dosage
Coleman et al., 2018 RCT	*N* = 213 100% 4th grade EB NR SWD NR	Participants were assigned to one of four conditions: (1) authentic representational text, (2) integrated text, (3) interpretational text, or (4) text only. They completed four tasks: (a) a prior-knowledge task, (b) reading one text and studying the diagram, (c) a reading comprehension posttest, and (d) a term-selection task.	Participants in the text only group did not receive any diagrams	**Researcher-developed comprehension measure**: Effect of treatment was not statistically significant $p = .96$	30-45 minutes
Collins et al., 2017 RCT	*N* = 1,062 47% 4th grade (*n* = 502) 53% 4th grade (*n* = 502) EB NR 19% SWD (*n* = 202)	Participants used thinksheets that scaffolded comprehension by guiding them to organize ideas from the text to structure a written response.	Participants in the control condition received the same amount of reading instruction using the same texts but did not use thinksheets or spend sustained time writing about the text.	**Researcher-developed comprehension measure**: Grade 4: One-year experimental group gained significantly more than control $p < .01$ Grade 5: Two-year experimental group gained significantly more than control $p < .05$	90 minutes per day for one to two school years
de Blume et al., 2020	*N* = 124 100% 8th grade (*n* = 124) EB NR 0% SWD (*n* = 0)	In their content area courses, participants received embedded literacy instruction including explicit vocabulary instruction and before-, during-, and after-reading strategies.	BAU content area instruction without literacy strategies	**Lexile scores:** $p < .001$, **Reading Inventory scores**: $p = .032$	Two school years
Farkas & Jang, 2019 QED	*N* = 62 100% 8th grade (*n* = 62) 0% EB (*n* = 0) 0% SWD (*n* = 0)	Participants received a combined comprehension strategy and motivation intervention	BAU ELA instruction	**DRP Cloze Reading Assessment:** significant effect of intervention on growth in reading comprehension, $p < .001$, with a medium effect size (ES = .372).	60 sessions, 70 minutes each
Fogarty et al., 2016 Randomized 2x2 Between-Subjects Design	*N* = 32 100% 8th grade 6% EB (*n* = 2) 6% SWD (*n* = 2)	Before reading a narrative passage, participants received three prompts: (1) Make personal connections with the story. (2) Think about the characters and situation. (3) When you are finished, you will be asked one question, "How does this story relate to your life?"	Participants read the passage and were then prompted to write everything they remembered about the passage before answering multiple choice questions.	**Researcher-developed, short answer and multiple-choice comprehension questions**: Participants in the relevance prompt condition had a higher average test score ($M = 3.56$, $SD = 1.41$) than the students in the comparison condition ($M = 2.94$, $SD = 1.51$), $g = .41$.	30 minutes
Goldman et al., 2019 RCT	*N* = 982 100% 9th grade EB NR SWD NR	Participants received a semester-long biology intervention focused on building science literacy, meaning making, discourse practices, and disciplinary knowledge.	BAU biology instruction	**Evidence-Based Argument (EBA) multiple-choice**: Significant treatment condition effect $p = .010$, ES = 0.26). **EBA essay questions:** No significant effect of treatment	20-22 weeks
Goodwin, 2015 RCT	*N* = 203 58% 5th grade (*n* = 117) 42% 6th grade (*n* = 86) 37% EB (*n* = 74) 7% SWD (*n* = 15)	Participants received comprehension strategy instruction and word solved unfamiliar words within text by finding units of meaning they recognized within large, unfamiliar words. They also played morphology reinforcement games.	The comparison group received same comprehension strategies instruction as the intervention group but did not receive morphological instruction.	Integrating morphological instruction was not differentially effective in supporting reading comprehension. **RC-Maze fluency**: ES -0.05 **RC-TOSREC**: ES 0.03	4 sessions, 30 minutes each

Study and design	Participants	Intervention conditions as implemented in the study	Comparison condition as implemented in the study	Outcome domain and reported findings (comprehension only)	Dosage
Hattan & Alexander, 2021 RCT	*N* = 149 52% 5th grade (*n* = 78) 48% 6th grade (*n* = 71) 0% EB (*n* = 0) 0% SWD (*n* = 0)	**T1: Relational Reasoning** – Participants looked for analogies, anomalies, antinomy, and antithesis between their knowledge and the reading material. **T2: Mobilization** – Participants reflected on what they knew before reading and what they learned after.	Text annotation: Participants used a familiar annotation strategy (underline, summarize, identify unknown words).	**Researcher-developed comprehension measure**: Significant treatment effect for T1 over control (p = 0.003). Significant treatment effect for T2 over control (p = 0.001). No significant difference between T1 and T2 (p = 0.06).	2 sessions, 1 hour each
Li et al., 2016	*N* = 63 students 46% 4th grade (*n* = 29) 54% 5th grade (*n* = 34) EB NR SWD NR	**T1**: Think before reading, think While reading, think After Reading (TWA) **T2**: Quality Talk (QT) **T3**: Hybrid intervention incorporating TWA and QT (Hybrid)	During the return to baseline (RTB) phase, teachers withdrew the intervention and participants returned to BAU.	**Researcher-Created Reading Comprehension Measure**: Fifth-grade participants demonstrated statistically significant increases on the comprehension measure in both phases: Phase I TWA: $p < .001$, $d = 1.70$ Phase II QT: $p = .01$, $d = .75$. Phase I Hybrid: $p < .001$, $d = 3.29$ Phase II Hybrid: $p < .001$, $d = 1.18$. No significant increase in comprehension scores for fourth-grade participants.	18 weeks; 40 minutes per day
Murphy et al., 2023	*N* = 288 4th and 5th grade EB NR SWD NR	Participants engaged in quality talk (QT) to promote thinking and learning through questioning, generating a claim, and providing support.	BaU language arts curriculum	**Researcher-Created Basic Comprehension Multiple Choice**: No statistically detectable change over time. **Researcher-Created Basic Comprehension Short Answer**: No statistically detectable change over time. **Researcher-Created High-Level Comprehension Essay**: Intervention status was a statistically significant predictor of comprehension scores over time.	ELA lessons over an entire school year
Preast et al., 2019	*N* = 126 52% 4th grade (*n* = 65) 48% 6th grade (*n* = 61) EB NR 0% SWD (*n* = 0)	Participants were assigned to partner dyads. After partner reading a science selection, they engaged in paragraph shrinking.	In this pretest-posttest design, the comparison condition was student knowledge and skill at pretest	**Researcher-developed maze comprehension measure:** Significant effect of treatment from pretest to posttest $p < 0.001$	15 sessions, 15-20 minutes each
Ramsay & Sperling, 2015 (Study 1)	*N* = 146 49% 5th grade (*n* = 72) 51% 6th grade (*n* = 74) EB NR SWD NR	Participants were randomly assigned to one of three perspective-specific groups: bird perspective condition, bike perspective condition, or control condition and asked to read a passage about the Wright brothers.	All participants were assigned to one of the three groups.	**Researcher-developed comprehension measures**: No statistically significant differences between either of the perspective conditions and the comparison group. *Total recall* - birds: p = 1.00; bikes: p = 1.00, *Knowledge* - birds: p = 1.00; bikes: p = 1.00.	60-90 minutes

Study and design	Participants	Intervention conditions as implemented in the study	Comparison condition as implemented in the study	Outcome domain and reported findings (comprehension only)	Dosage
Ramsay & Sperling, 2015 (Study 2)	*N* = 83 100% 8th grade EB NR SWD NR	Participants were randomly assigned to one of three perspective-specific groups: bird perspective condition, bike perspective condition, or control condition and asked to read a passage about the Wright brothers.	All participants were assigned to one of the three groups.	**Researcher-developed comprehension measures**: No statistically significant differences between either of the perspective conditions and the comparison group on *Total recall* - birds: $p = 1.00$; bikes: $p = 1.00$); *Knowledge* - birds: $p = 1.00$; bikes: $p = 1.00$. No statistically significant effect of perspective on comprehension of perspective-relevant content among the three groups $p = .58$.	90-120 minutes
Roberts et al. (2023) RCT	*N* = 7,183 100% 8th grade (*n* = 7,183) 8% EB (*n* = 575) 12% SWD (*n* = 862)	Embedded in U.S. History content, participants received: (1) comprehension instruction, (2) academic vocabulary, (3) comprehension checks, (4) application activities	BAU U.S. History instruction	**GM-RC:** Treatment effect did not differ statistically from 0. $p = .425$	Program can be completed in 6 weeks at 3 hours per week, but actual dosage was NR
Scott & Dreher (2021) QED	*N* = 205 100% 6th grade EB NR SWD NR	Participants received instruction in identifying rhetorical patterns used to organize content in the social studies textbook: list, topical net, matrix, linear string, and falling dominoes	BAU social studies instruction	**Graphic representation**: No statistically significant effect of treatment $p = 0.43$ **Summarization**: No statistically significant effect of treatment $p = 0.06$	47 sessions, 40 minutes each
Strong (2023) RCT	*N* = 351 46% 4th grade (*n* = 160) 54% 5th grade (*n* = 191) SWD NR EB NR	**T1**: Read STOP Write included the following components: (1) Read, (2) Summarize, (3) Text Structure, (4) Organize, (5) Plan, (6) Write. **T2**: RARE reading & writing included the following components: (1) Read, (2) Answer questions, (3) Review answers, (4) Reread, (5) Restate, and (6) Explain	There was no control group. All participants were assigned to either T1 or T2.	Gray Silent Reading Test (GSRT): No differences between groups $p = .31$	16 lessons, 60 minutes each
Sukhram & Monda-Amaya (2017) QED	*N* = 60 100% 7th grade (*n* = 60) EB NR 60% SWD (*n* = 36)	**T1**: Oral repeated reading with no corrective feedback - participants read one narrative and one expository passage 3 times. **T2**: Oral repeated reading with corrective feedback - same at T1, but participants received feedback during their first 2 readings in the following areas: mispronunciations, hesitations, omissions, substitutions, and insertions.	There was no control group. All participants were assigned to either T1 or T2.	**Qualitative Reading Inventory-3**: No statistically significant difference between groups $p = .856$.	Average dosage = 39 minutes (range: 32-50 minutes)
Swanson et al., (2017) RCT	*N* = 78 100% 8th grade (*n* = 78) 24% EB (*n* = 19) 12% SWD (*n* = 9)	Embedded in 8th grade social studies content, participants received: (1) comprehension instruction, (2) academic vocabulary, (3) comprehension checks, (4) application activities	BAU 8th grade social studies instruction	**Modified Assessment of Social Studies Knowledge**: The effect of the intervention was statistically significant. $p = .00$ **GMRT-RC**: No significant difference between groups. $p = .55$, ES = .10	11 units, 8-15 sessions each, taught in 45-minute class periods

Study and design	Participants	Intervention conditions as implemented in the study	Comparison condition as implemented in the study	Outcome domain and reported findings (comprehension only)	Dosage
Syal & Nietfeld, 2024 QED	*N* = 234 100% 5th grade (*n* = 234) SWD NR EB NR	Participants engaged in a game-based learning environment (GBLE; Missions with Monty) in which they read science texts to research a topic then highlighted main ideas, selected the best summary, and used metacognitive comprehension monitoring.	Participants in the comparison group read the same passages and completed the same assessments in a non-game-based digital platform.	**GSRT**: Significant main effects for time for both groups, $p < .001$, $g = 0.52$ Significant effect of treatment, $p = 0.11$, $g = 0.56$	12 sessions, 45 minutes each
Vaughn et al., 2017 RCT	*N* = 1,629 100% 8th grade (*n* = 1,629) 27% EB (*n* = 435) 10% SWD (*n* = 160)	Embedded in 8th grade U.S. History, participants received: (1) comprehension instruction, (2) academic vocabulary, (3) comprehension checks, (4) application activities, plus enhancements to support emergent bilingual students	BAU 8th grade U.S. History instruction	**Modified Assessment of Social Studies Knowledge**: The effect of the intervention was statistically significant. $p < .05$, ES = .20 **GMRT-RC**: No statistically significant difference between groups, ES = .12	225 minutes per week for 8 weeks, then 45 minutes per week for 12 weeks (~39 hours)
Vaughn et al., 2015 RCT	*N* = 1,487 100% 8th grade (*n* = 1,487) 5% EB (*n* = 71) 8% SWD (*n* = 117)	Embedded in 8th grade U.S. History, participants received: (1) comprehension instruction, (2) academic vocabulary, (3) comprehension checks, (4) application activities	BAU 8th grade U.S. History instruction	**ASK Reading Comprehension in Social Studies**: No statistically significant difference between groups, $p = .64$, $g = .02$ **GMRT-RC**: No statistically significant difference between groups, $p = .87$, $g = .01$	30 sessions, 50 minutes each
Wijekumar et al., 2025 RCT	*N* = 2,170 100% 5th grade (*n* = 2,170) EB NR SWD NR	Participants received web-based intelligent tutor instruction for structure strategy (ITSS) that adapted tasks for individual needs and teacher delivered knowledge acquisition and transformation (KAT) framework instruction	BAU 5th grade reading instruction	**GSRT**: No significant effect of treatment (ES = .23) **Researcher-developed comprehension measure**: Effect sizes for all outcomes were considered practically significant (>.25).	ITSS for 45 minutes weekly for six months, KAT 15-30 minutes daily
Wijekumar et al., 2017 RCT	*N* = 2,489 100% 5th grade (*n* = 2,489) EB NR SWD NR	Participants received web-based intelligent tutor instruction in four areas: (1) identifying text structure, (2) selecting and encoding information, (3) writing the main idea, (4) using text structures to remember key information	BAU 7th grade reading instruction	**GSRT**: Significant effect of treatment ($p < .05$, ES = .18) **Researcher-developed comprehension measure**: Significant effect of treatment (ES = .15-.92)	30-45 minutes weekly for 6-7 months

Appendix E

Tier 2 Intervention Studies

Study and design	Participants	Intervention conditions as implemented in the study	Comparison condition as implemented in the study	Outcome domain and reported findings (comprehension only)	Dosage
Al Otaiba et al., 2023 RCT	*N* = 59 100% 4th grade 51% EB (*n* = 30) 12% SWD (*n* = 5)	Growth mindset training + Lindamood Phoneme Sequencing Program (LiPS; review, new reading instruction, tracking, reading/spelling, and reading connected text)	BAU school-provided reading instruction and intervention	**WJ-IV PC:** Hedges' *g* = 0.07	1–78 sessions, 30 to 60 minutes each
Barnes et al., 2024 RCT	*N* = 145 6th - 8th grade 14% EB (*n* = 21) 7% SWD (*n* = 10)	**T1 Tutor-led** - Participants received instruction and practice in making inferences from a tutor across five modules: (1) pronoun reference, (2) text-connecting inferences, (3) inferring words from context, (4) knowledge-based inferences, (5) mixed practice. **T2: Computer-delivered** - Participants received the same instruction and practice delivered by a computer.	BAU school-provided reading instruction and intervention	**Researcher-developed CIRCA**: T1 outperformed T2 (*p* - adjusted = .04) and BAU (*p* - adjusted = .04). **Bridging Inferences Task (Bridge-It)**: T1 outperformed BAU (*p* - adjusted = .16, ES = 0.35), and T2 outperformed BAU (*p* - adjusted = .16, ES = 0.32), but differences were not statistically significant. **WIAT-III Reading Comprehension subtest**: T1 outperformed T2 (*p* - adjusted = .20, ES = 0.32) on inferential items, but the difference was not significant. No difference between groups on literal items.	26 lessons
Barth et al., 2016 RCT	*N* = 134 38% 6th grade (*n* = 51) 41% 7th grade (*n* = 55) 21% 8th grade (*n* = 28) EB NR 31% SWD (*n* = 42)	Participants received instruction with corrective feedback in three areas: (1) identifying key words and main ideas, (2) synthesizing information to summarize and make inferences, (3) integrating information from multiple texts	BAU core-content instruction	**Gates MacGinitie Reading Test - RC**: *g* = 0.00 **WJ III - PC**: *g* = -0.06 **Bridge-IT**: *g* = 0.04 No statistically significant differences between groups.	32 sessions, 40 minutes each (~21 hours)
Denton et al., 2017 QED	*N* = 48 100% 9th grade (*n* = 48) EB NR 6% SWD (*n* = 3)	Participants received a combination of word study and inference generation instruction in order to read narrative text segments and then paraphrase them.	Participants in the control group read texts and answered questions on the computer.	**Bridge-IT**: No main effect of intervention group **GMRT-RC**: No main effect of intervention group	9 sessions, 40 minutes each

Study and design	Participants	Intervention conditions as implemented in the study	Comparison condition as implemented in the study	Outcome domain and reported findings (comprehension only)	Dosage
Fite et al., 2021 SCD	*N* = 3 Ages 12-14 100% EB 0% SWD	**T1 Repeated readings** - Participants read a passage aloud four times with cues to focus on speed and comprehension. They were provided corrective feedback and offered praise and reinforcement if they improved their time. **T2 Repeated readings + preview-review** - Participants received T1 plus: background information, explicit instruction of targeted vocabulary, opportunity to make predictions, a cold read of the passage in Spanish and asked to write a 20-word summary.	In baseline, participants completed four unassisted readings without corrective feedback.	**Reading Comprehension Rate**: Visual analysis supported the finding that T2 increased the overall reading comprehension rate for all participants in comparison with baseline and T1. **Reading Comprehension Accuracy**: Causality could not be experimentally substantiated due to variability and a downward trend in the baseline condition. Only one participant, met the criteria for a positive effect	21 sessions
Hall et al., 2020 RCT	*N* = 78 100% 6th - 7th grade 77% EB (*n* = 60) 12% SWD (*n* = 9)	Small groups received explicit instruction in inference generation.	BAU school-provided ELA instruction (Accelerated Reader)	**Gates MacGinitie Reading Test - RC:** Group membership predicted outcome scores $p = .01$, $d = 0.60$.	24 sessions, 40 minutes each
Haria & Midgette, 2015	*N* = 7 100% 5th grade° EB NR SWD NR	Participants received instruction in critical analysis of argumentative text: (1) developing a purpose for reading, (2) reading the text carefully, (3) identifying argumentative elements, (4) summarizing the argument, (5) critically analyzing the argument	During baseline, participants completed probes with no strategy instruction. They were directed to read, verbally summarize, and critically analyze the author's argument	Overall, the total PND for postintervention was 75%	24-26 sessions, 45 minutes each
Hebert et al. (2018)	*N* = 47 37% 4th grade (*n* = 17) 63% 5th (*n* = 28) EB NR SWD NR	Treatment students were taught to identify and discriminate among the five text structures used by authors of expository text: description, sequence, cause/effect, compare/contrast, and problem/solution.	BAU core-content instruction	**Ability to determine text structure**: Statistically significant effect of treatment $p < 0.001$, $d = 0.94$. **Expository text comprehension through oral retell**: No statistically significant difference between groups $d = 0.29$.	8 sessions, 25-30 minutes each
Hebert et al. (2014)	*N* = 192 100% 4th grade (*n* = 192) 14% SWD (*n* = 26) EB NR	**TI Read and Study Condition**: Participants read a passage and studied the important ideas. They could study the text any way they chose, as long as it did not involve writing. **T2 Note-Taking Condition**: Participants took notes on important information. Instructors modeled paraphrasing in note form. Choices about important information, and the organization of notes, were up to the individual. **T3 Extended Writing Condition**: Participants wrote compare and contrast essays.	All participants were assigned to one of the three treatment conditions	**Researcher-adapted topic knowledge measure:** No statistically significant differences between groups. **Researcher-developed application essay**: No statistically significant differences between groups. **Researcher-developed multiple choice comprehension measure:** T2 and T3 outperformed T1 $p = .029$	3 days at 45 minutes each, 1 day at 60 minutes

Study and design	Participants	Intervention conditions as implemented in the study	Comparison condition as implemented in the study	Outcome domain and reported findings (comprehension only)	Dosage
Lovett et al. (2021) RCT	*N* = 514 32% 6th grade (*n* = 160) 39% 7th grade (*n* = 203) 29% 8th grade (*n* = 151) NR EB 100% SWD	**T1 PHAST + Fluency-Focus Adjunct**: Participants received PHAST decoding and word identification instruction plus a fluency emphasis that included additional practice in sounds, affixed, irregular words, and connected texts. **T2 PHAST + Comprehension-Focus Adjunct**: Participants received PHAST decoding and word identification instruction plus a comprehension emphasis that included strategies: prior knowledge, predicting, goals, clarifying, questioning, and summarizing	BAU intervention (school-provided remedial instruction)	**WJ Passage Comprehension**: *g* = 0.36 **SRI Comprehension**: *g* = 0.03	40-60 minutes daily, 3-5x per week, 100-125 hours total
Reed & Lynn (2016)	*N* = 24 4% = 5th grade (*n* = 1) 70% = 6th grade (*n* = 17) 16% = 7th grade (*n* = 4) 8% = 8th grade (*n* = 2) EB NR 79% = SWD (*n* = 19)	Participants were randomized to one of three treatments. **T1 Inference Only (IO)**: Participants used a graphic organizer to record information from a fictional passage. **T2 Inference + Goal Setting Individual (IIG)**: In addition to procedures from T1, participants set a goal for the number of inferences they thought they could make and developed three steps for reaching that goal. **T3 Inference + Group Goal Setting (IGG)**: In addition to procedures from T1, the IGG group collectively set a goal for how many inferences they thought they could make. All students had to agree to the same goal and then worked with the interventionist to develop three steps for how they could reach the goal.	All participants were assigned to one of the three treatment conditions.	**easyCBM**: T3 significantly outperformed T1 and T2, *p* = .001.	One session lasted 30-40 minutes. Sessions 2-7 lasted 3-5 minutes each.
Ritchey et al. (2017)	*N* = 46 100% 5th grade (*n*= 46) 6.5% SWD (*n* = 3) 6.5% EB (*n* = 3)	Participants received a multicomponent strategy using science texts and the acronym PLUG IN: Previewing, Linking to what you know, Using fix-up strategies, Generating questions, In your own word (main idea and summarizing), Now answer the questions.	BAU school-wide intervention	**Assessment of Knowledge and Strategy Use for Information Text:** *g* = 0.724, *p* = .022 **QRI Comprehension**: *g* = 0.611, *p* = .045 **TOSREC**: *g* = .155, *p* = .155 **WIAT Reading Comprehension**: *g* = -0.037, *p* = .891	40-44 sessions, 30 minutes each
Sanders et al., 2019 SCD	*N* = 30 33% = 4th grade (*n* = 10) 50% = 5th grade (*n*=15) 17% = 6th grade (*n* = 5) EB NR 79% = SWD (*n* = 10)	During intervention, participants received the SRSD think before reading, think while reading, and think after reading (TWA) intervention, including review of rules, introduction to new vocabulary, strategy instruction, and review.	BAU school-provided Tier 2 comprehension intervention	**Researcher-developed reading comprehension probes**: No statistically significant difference between groups (*p* = 0.784) **Maze**: No statistically significant difference between groups (*p* = 0.621)	Lessons were completed over the course of 11 days

Study and design	Participants	Intervention conditions as implemented in the study	Comparison condition as implemented in the study	Outcome domain and reported findings (comprehension only)	Dosage
Stevens et al., 2019 RCT	*N* = 62 45% 4th grade (*n* = 28) 55% 6th grade (*n* = 34) 63% EB (*n* = 39) 3% SWD (*n* = 2)	Participants received multicomponent reading instruction with the following components: (1) lesson opening, (2) background knowledge, (3) text reading, (4) get the gist, (5) fix-up strategies, (6) review and preview	Comparison group at one campus received BAU science and social studies instruction. At the second campus, the comparison group participated in their usual after school activities.	**GMRT-RC**: No significant effect of treatment (*g* = -0.19, *p* = .198) **Structure Identification and Main Idea Generation Test (SIMIG)**: Group membership significantly predicted main idea generation (*g* = 0.70, *p* = .003) and text structure identification (*g* = 0.75, *p* = .003). **Strategy Use Measure (SUM)**: Group membership significantly predicted question and main idea generation (*g* = 0.62, *p* = .009), but did not significantly predict main idea identification (*g* = 0.45, *p* = .042).	25 lessons, 45 minutes each
Wanzek et al., 2017 RCT	*N* = 450 100% 4th grade (*n* = 450) 13% EB (*n* = 59) 15% SWD (*n* = 68)	Participants received the multicomponent Passport to Literacy program as supplementary reading instruction. It delivered the following components: phonics, word recognition, fluency, vocabulary, and comprehension.	BAU school-provided Tier 1 and Tier 2 reading instruction	**WJIII-PC**: Significant effect of intervention, *p* = .002, ES = .38.	120 lessons, 30 minutes each
Washburn et al., 2021 SCD	*N* = 6 100% 4th grade (*n* = 6) 0% EB (*n* = 0) 0% SWD (*n* = 0)	During intervention, participant pairs received the TRAP paraphrasing strategy which explicitly taught to paraphrase main idea and two supporting details.	During baseline, participants read a passage silently, recorded everything they remembered on an iPad, and answered comprehension questions, all without support.	**Fountas and Pinnell BAS with researcher-developed comprehension questions**: NAP between baseline and independent performance indicated medium effects for four participants (.87-.90) and strong effects for two participants (.96-1.0)	15 sessions, 30 minutes each

Appendix F

Tier 3 Intervention Studies

Study and design	Participants	Intervention conditions as implemented in the study	Comparison condition as implemented in the study	Outcome domain and reported findings (comprehension only)	Dosage
Alqahtani, 2021 SCD	*N* = 2 100% 4th grade EB NR; SWD NR	**T1**: Participants (1) previewed generic comprehension questions, (2) read a passage, (3) received corrective feedback, (4) read the passage three more times, (5) answered comprehension questions and received corrective feedback. **T2**: Same procedure as T1, except at step 4, where participants listened to the passage read once from an iPad.	During baseline sessions, participants read a paper copy of a passage. The teacher then took the passage away and asked them to retell everything they could remember.	No conclusions regarding a functional relation were possible	~24 sessions, ~20 minutes each (~8 hours)
Barth & Elleman, 2017 RCT	*N* = 66 24% 6th grade (*n* = 16) 38% 7th grade (*n* = 25) 38% 8th grade (*n* = 25) 0% EB 30% SWD (*n* = 20)	In groups of 2-3, participants received explicit, multistrategy inference instruction that included using context clues to determine word meaning, activating prior knowledge, understanding author's purpose and characters' perspectives, and answering inference questions.	BAU remedial-reading intervention class	**WIAT-III RC**: Significant treatment effect *p* = .0111, *g* = 0.46 **QRI-5 Inference-making**: Significant treatment effect *p* = .035, *g* = 0.36.	10 sessions, 45 minutes each (~7.5 hours)
Cullen et al., 2014 SCD	*N* = 6 17% 3rd grade (*n* = 1) 83% 5th grade (*n* = 5) EB NR 100% SWD (*n* = 6)	In addition to baseline instruction, participants received instruction via the Headsprout Comprehension computer program in answering 4 question types: (1) finding facts, (2) making inferences, (3) finding the main idea, and (4) understanding vocabulary.	During baseline sessions, participants received BAU Houghton Mifflin reading instruction.	**Ohio Achievement Assessment:** The slope of the upward trend in intervention ranged between 0.55 and 0.73. **AIMSweb Maze**: The slope of the upward trend in intervention ranged between 0.40 and 1.43.	8-15 sessions, 15-30 minutes each
Drill & Bellini, 2021 SCD	*N* = 3 33.3% 6th grade (*n* = 1) 33.3% 7th grade (*n* = 1) 33.3% 8th grade (*n* = 1) 0% EB (*n* = 0) 100% SWD (*n* = 3)	During intervention sessions, participants received instruction that included video self-modeling, readers theater and story mapping.	During baseline sessions, reading comprehension data were collected without implementation of the intervention.	**Researcher-developed comprehension quiz**: Robust improved rate of differences scores ranged from 0.651 to 0.671 across participants, indicating moderate effect sizes.	24-26 sessions, 30-60 minutes each
Hawkins et al. (2015)	*N* = 4 100% 4th grade EB NR 0% SWD (*n* = 0)	**T1** (Repeated Reading): Participants completed repeated readings of passages (3x) with error correction **T2** (Listening-While-Reading): Participants completed repeated readings of passages, reading aloud while listening to audio recordings of the passages on an MP3 player	There was no baseline or control condition in this alternating treatment design.	**MAZE:** Based on condition means, repeated reading led to slightly higher Maze performance for all participants	12 weeks, 1-2 sessions per week, 5-21 minutes per session

Study and design	Participants	Intervention conditions as implemented in the study	Comparison condition as implemented in the study	Outcome domain and reported findings (comprehension only)	Dosage
Head et al. (2018)	*N* = 3 33% 5th grade (*n* = 1) 33% 8th grade (*n* = 1) 33% HS (*n* = 1) 100% SWD	The Corrective Reading Comprehension: B1 reading comprehension program is scripted and addresses reasoning, information, vocabulary, sentence, basic comprehension, and writing skills.	During baseline, data were collected without any instruction.	**WRMT-III RC:** A functional relation was demonstrated between the IV and specific reading comprehension skills. Each student mastered each skill presented and maintained performance once instruction had ended. **AIMSWeb MAZE probes:** All three participants exhibited gains from pre to posttest	Approximately 30 lessons, 30 minutes each
Howorth et al. (2016)	*N* = 4 50% 5th grade (*n* = 2) 50% 6th grade (*n* = 2) NR EB 100% SWD (*n* = 4)	During intervention, participants received the think before reading, think while reading, and think after reading (TWA) intervention, including review of rules, introduction to new vocabulary, strategy instruction, and review.	During baseline, participants read a nonfiction passage and retold everything they could remember.	**Retell**: PND range: 50%-100%. PEM range: 83.3%-100%. **Comprehension questions**: PND range: 83.3-100% PEM range: 83.3%-100%.	Six sessions, 45 minutes each
Kouo & Visco (2021)	*N* = 2 100% 7th grade 100% SWD 0% EB	During intervention, participants received three alternating treatments to support inference making. **T1 TinyTap**: an interactive iPad app on which students responded to a visual by dragging and sorting text and background information before taking a probe. **T2 Videos**: Participants viewed a video once before taking a probe. **T3 Graphic organizer**: Participants read and completed a graphic organizer before taking a probe.	During baseline, participants read a passage and answered multiple choice comprehension questions	**Mean percentage of correct responses to inferential comprehension probes:** Participant 1: T1 was favored over T2 and T3 (T1 65.91%; T2 50%; T3 43.18%). Participant 2: T1 was favored over T2 and T3 (T1 63.64%; T2 50%; T3 42.50%).	75 sessions, 20 minutes each
Marshall & Myers (2021)	*N* = 2 50% 9th grade (*n* = 1) 50% 11th grade (*n* = 1) EB NR 100% SWD (*n* = 2)	**TI Infrequent**: Each student's restricted interest (RI) was embedded one time within each story passage. **T2 Frequent:** Each student's RI was embedded on average every three sentences within each story passage.	During the control condition, the original AIMSweb passage was used with no RI embedded.	Participant's performance was higher in both T1 and T2 conditions than in the control condition. There were no clear differences in performance between the two treatment conditions.	Sessions occurred biweekly for 10 weeks
Rouse et al., 2014	*N* = 2 100% 5th grade (*n* =2) 50% EB (*n* =1) 100% SWD *(n* =2)	During intervention sessions, participants read expository passages and answered embedded questions. As they demonstrated proficiency with answering embedded questions, the questions were faded and replaced with a prompt for participants to generate questions.	During baseline sessions, participants read expository passages and took a multiple-choice quiz.	**Researcher-developed comprehension quiz**: The PND scores indicated mixed results at 100% for Participant 1, and 51% for Participant 2.	31 sessions, 30 minutes each
Sanders, 2021 SCD	*N* = 4 50% 5th grade (*n* = 2) 50% 6th grade (*n* = 2) EB NR 100% SWD (*n* = 4)	During intervention, participants were taught the SRSD TRAP strategy: Think before reading, Read the paragraph, Ask yourself what the paragraph is mostly about and what is the most important information, and Paraphrase the paragraph.	During baseline sessions, participants read a passage from the 6th grade science text and completed the oral-retell probe without strategy instruction.	**Researcher-developed oral-retell probes**: PND for all participants was 100%, ES 2.73	The six lessons were conducted over a 40–60-minute time period.

Study and design	Participants	Intervention conditions as implemented in the study	Comparison condition as implemented in the study	Outcome domain and reported findings (comprehension only)	Dosage
Schmitt et al., 2019	*N* = 4 100% 8th grade (*n* =4) EB NR 100% SWD *(n* =4)	Treatment alternated between a continuous TTS condition (T1; Kurzweil 3000), and discontinuous TTS condition (T2; ReadPen), and a no-accommodation condition (T3).	During the no-accommodation condition, participants read passages silently and answered questions without any AT	**Comprehension accuracy:** T1 favored over T2 and T3 for three out of four participants; T3 favored over T1 and T2 for the fourth. T2 favored over T3 for two participants (ES = 0.39 and 0.29); T3 favored over T2 for the remaining two (ES = 0.26 and 0.22) **Comprehension rate**: ES favoring T1 over T2 were large (0.91 to 0.99). ES in favor of T1 over T3 were similarly large for 3 participants (0.97 to 0.99) and moderate (.69) for the 4th. T3 resulted in greater comprehension rates than T2 (ES = 0.48 to 0.95.)	10 sessions, 20 minutes each
Solis et al., 2021 (Study 1) SCD	*N* = 3 100% 4th grade (*n* = 3) EB NR 100% SWD (*n = 3)*	During interventions sessions, participants learned a target vocabulary word, read an expository or interest-based passage, and generated a main idea statement before answering comprehension questions.	During baseline sessions, participants learned a target vocabulary word, read an expository passage, and answered comprehension questions.	**Researcher-developed reading comprehension CBM**: No difference in performance between interest-based and expository readings	19-26 sessions, 30-40 minutes each
Solis et al., 2021 (Study 2) SCD	*N* = 4 100% 4th grade (*n* = 4) EB NR 100% SWD (*n = 4)*	During interventions sessions, participants learned a target vocabulary word, read an expository or interest-based passage, and generated a main idea statement before answering comprehension questions.	During baseline sessions, participants learned a target vocabulary word, read an expository passage, and answered comprehension questions.	**Researcher-developed reading comprehension CBM**: No difference in performance between interest-based and expository readings	19-26 sessions, 30-40 minutes each
Solis et al., 2015 RCT	*N* = 44 100% 9th grade (*n* = 44) 39% EB (*n* = 17) 27% SWD (*n* = 12)	Participants received a multicomponent intervention that included: vocabulary/concept instruction, text-based instruction, grammar print structures, complex language structures, and inference reading drills.	Comparison participants were enrolled in an elective course without reading intervention	**WJIII-PC**: No significant effect of treatment *p* = .26.	80 sessions, 90 minutes each
Solis et al., 2018 RCT	*N* = 91 100% 9th grade (*n* = 91) 25% EB (*n* = 23) 15% SWD (*n* = 14)	Participants received a multicomponent intervention that included: review walk-in slips, essential words, text-based expository reading, chapter book reading, inference reading, and word study fluency	Comparison participants were enrolled in an elective course without reading intervention	**WJIII-PC**: No significant effect of treatment *p* = .165, *g* = .45. **TOSREC**: No significant effect of treatment after correction for Type 1 error *p* = .05, *g* = .46.	Average dosage = 114 hours
Williams & Vaughn, 2020 RCT	*N* = 85 100% 9th grade 100% EB 100% SWD	In addition to multicomponent reading instruction focused on word study, fluency, vocabulary, comprehension, and knowledge building, emergent bilingual participants received additional academic language development in the form of explicit instruction of academic vocabulary and strategies to independently determine meanings of unfamiliar words.	BAU elective course instruction	**TOSREC**: No significant effect of treatment *p* = .47, *g* = 0.14 **GMRT-4 RC**: No significant effect of treatment *p* = .90, *g* = 0.02	3.75-4.25 hours per week for one school year