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A Systematic Review of Academic Discourse Interventions for School-Aged Children with Language-Related Learning Disabilities

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1 A Systematic Review of Academic Discourse Interventions for School-Aged Children with
2 Language-Related Learning Disabilities

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Abstract

Purpose: This systematic review synthesized a set of peer-reviewed studies published between 1985 and 2019 and addressed the effectiveness of existing narrative and expository discourse interventions for late elementary and middle school-aged students with language-related learning disabilities.

Method: A methodical search of the literature for interventions targeting expository or narrative discourse structure for students ages 9-14 with group experimental designs identified 33 studies, seven of which met specific criteria to be included in this review.

Results: An 8-point critical appraisal scale was applied to analyze the quality of the study design and effect sizes were calculated for six of the seven studies; equivocal to small effects of far transfer outcomes (i.e., generalizability to other settings) and equivocal to moderate near transfer outcomes (i.e., within the treatment setting) were identified. The most effective intervention studies provided explicit instruction of expository texts with visual supports and student-generated learning materials (e.g., notes or graphic organizers) with moderate dosage (i.e., 180-300 minutes across 6-8 weeks) in a one-on-one or paired group setting. Greater intervention effects were also seen in children with reading and/or language disorders, compared to children with overall academic performance difficulties.

Conclusions: A number of expository discourse interventions showed promise for student use of learned skills within the treatment setting (i.e., near transfer outcomes), but had limited generalization of skills (i.e., far transfer outcomes).

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46 A Systematic Review of Academic Discourse Interventions for School-Aged Children with
47 Language-Related Learning Disabilities

48 School-based speech-language pathologists (SLPs) provide services to address a variety
49 of student needs. A significant portion of the SLP caseload includes students with language-
50 related learning disabilities (LLD). Students with specific language disorders and difficulties in
51 reading, writing, and speaking in all levels of academic and social communication (i.e., word,
52 sentence, discourse) are included in LLD. Everyday social interactions with peers and teachers
53 often occur at the discourse level and are difficult for these students. Discourse is any unit of
54 spoken or written communication, longer than one sentence, in any combination of
55 conversational, narrative, persuasive, and expository structures that aid in our interactions with
56 the world (Hughes, LaRae & Schmidek, 1997).

57 With implementation of the Common Core State Standards Initiative in 2010, students as
58 early as kindergarten are expected to be able to use narrative and expository discourse forms in
59 the classroom (corestandards.org). Narrative discourse includes all storytelling events from early
60 education “share-and-tell” tasks (Temple Adger & Wright, 2015) to advanced productions of
61 complex fictional or personal narratives (Hughes et al., 1997). Narrative discourse requires the
62 use of decontextualized language (i.e., discussing events beyond the immediate context), an
63 important skill for understanding language in classrooms (Bates & MacWhinney, 1979;
64 Curenton & Justice, 2004). Expository discourse is non-narrative, informational language, often
65 presented in academic lessons and textbooks (Nelson, 1993; Hughes et al., 1997); it includes
66 various text structures such as description, explanation, procedure, and persuasion. Ability to use
67 and understand these text structures is critical to academic success.

68 Comprehension and production of these discourse genres is impacted by poor schema

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69 retrieval and organization, memory for information within a text, and knowledge of discourse
70 structures (Westby, VanDongen & Maggart, 1989). Understanding the causal framework that
71 underlies narrative discourse (McKinney, Short & Feagans, 1985; Capps, Losh, & Thurber,
72 2000) and various expository text structures (Dickson, Simmons & Kameenui, 1998; Gersten,
73 Fuchs, Willams & Bakers, 2001) are critical to accessing the curriculum. Students with LLD
74 may gather information from texts in a random fashion, rather than systematically finding and
75 retaining key ideas within an organized mental framework. Inefficient processing strategies may
76 increase strain on cognitive load and negatively impact comprehension and subsequent academic
77 success.

78 Research indicates that typically developing children tend to have mastered the basic
79 structure of narrative by age 9 (Stein & Glenn, 1982; Merritt & Liles, 1987). Berman and Nir-
80 Sagiv (2007) found that young children are capable of identifying differences in narrative and
81 expository discourse. However, students with LLD often struggle to master production of
82 narrative discourse and may not catch up to their typically developing peers (Snyder & Downey,
83 1991). To further confound difficulties in comprehension and production for students with LLD,
84 more expository focused texts are included in the curriculum, phasing out the majority of
85 narrative-based lessons around age 9 (Hughes, LaRae & Schmidek, 1997). If the cognitive
86 requisites of narrative discourse (e.g., use of decontextualized language, understanding causal
87 connections, etc.) are not fully developed in students with LLD, attempting expository discourse
88 may prove quite challenging. Pressure to understand the various forms of expository discourse
89 structure without mastery of narrative may even contribute to the “fourth-grade slump” (Chall,
90 Jacobs, & Baldwin, 1991; Merritt & Liles, 1987; Vandewalle et al., 2012).

91 Studies have shown that at least half of young students with language-related disabilities

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92 have significant literacy and academic issues as they get older (Conti-Ramsden, St. Clair,
93 Pickles, & Durkin, 2012; Dockrell, Lindsay & Connelly, 2009), making it critical for them to
94 receive intervention beyond the early grades. As language-related disabilities are not likely to
95 disappear, the need for specific intervention for late elementary and middle school students is
96 warranted.

97 Specific interventions, often developed in research settings and tested for efficacy
98 through controlled experiments, are designed by researchers interested in studying certain
99 phenomena or populations. When designing an intervention for students with LLD, it is
100 important for researchers to consider how well their intervention is being implemented in the
101 study and the effect it has on potential participants. In order to measure both of those aspects,
102 fidelity of interventionists and proper qualification of outcome measures must be determined to
103 generate accurate conclusions about the efficacy and effectiveness of an intervention. Studies
104 and definitions of efficacy and effectiveness are done across many fields, including medicine,
105 education, and social sciences like SLP (Kim, 2013; Singal et al., 2014).

106 Efficacy of an intervention is related how well the treatment was delivered in an ideal
107 circumstance, which supports that the effects of an intervention are due to the intervention itself
108 instead of maturation effects of the population (Singal et al., 2014). Fidelity thresholds of 80% or
109 greater within the controlled environment of the study help to measure the efficacy of studies.
110 While many studies report fidelity statistics, they are not always systematically measured and
111 included as an outcome, indicating that clinicians may need to be wary of results. Additionally,
112 while intervention fidelity checklists may be provided to the interventionists in many studies,
113 those checklists are not always published, making it difficult for clinicians to properly implement
114 those evidence-based practices. This also impacts the replication of studies, leading to

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115 researchers creating new measures for their studies and causes difficulty in establishing valid,
116 reliable measurements (Fixsen, Blase, & Van Dyke, 2019; Olswang & Prelock, 2015).

117 When studies fail to provide checklists and fidelity information for clinicians to
118 implement an intervention in a real-world setting, they contribute to the ‘research-to-practice
119 gap’. The research-to-practice gap is a gap between the existing literature of research and the
120 real-world practice of clinicians that has been studied for decades in a variety of fields (Olswang
121 & Prelock, 2015; Morris, Wooding, & Grant, 2011). The field of Implementation Science studies
122 the research-to-practice gap, focusing on the effectiveness of innovations, or the ability for high-
123 quality, controlled intervention studies, to generalize to students in real-world settings (Fixsen, et
124 al. 2019; Singal, Higgins, & Waljee, 2014). To address the effectiveness of interventions, this
125 review focuses on near (i.e., within intervention) and far transfer (i.e., generalizability) effects of
126 studies. Near transfer effects, those that are a direct result of the skills learned within treatment
127 and their use within the study context, help to determine efficacy of the study. Far transfer effects
128 are those that generalize to other settings or topics outside of the specific treatment setting or the
129 effectiveness of the treatment overall. Both of these effects are critical to implementing best
130 practices to serve a given population (Singal et al. 2014).

131 Relevant Prior Reviews

132 Several reviews have been published synthesizing narrative and expository interventions
133 for school-aged children with and without language disorders. Petersen’s (2011) systematic
134 review of narrative-based interventions for oral narrative macrostructure (i.e., story grammar)
135 and microstructure (i.e., the total number of words, mean length of utterance) in preschool and
136 school-aged children with language or learning disabilities provides valuable information to the
137 field. While Petersen reported low overlap of intervention characteristics across studies, he

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138 highlighted several major factors contributing to the interventions. All of the studies measured
139 the development of macrostructure ability through retell and spontaneous generation of
140 narratives. Several studies also focused on explicit instruction of causality and temporal relations
141 to develop microstructure skills using picture prompts, narrative illustration tasks, and icons.
142 Petersen concluded that large effect sizes should be interpreted with caution because of the small
143 sample sizes and low experimental control across studies.

144 In a 2016 narrative review, Ward-Lonergan and Duthie summarized interventions
145 designed to target expository reading comprehension in students with language disorders. The
146 review does not specify ages or grades; however, the included studies primarily targeted students
147 in late elementary or beyond. The authors examined a series of interventions that used strategy
148 approaches (e.g., focus on use of a graphic organizers) or content approaches (e.g., focus on
149 specific content). Instructors in the content approaches emphasized particular information in the
150 text through active discussion to help students build mental representations. This review
151 suggested benefits of content and strategy-based approaches independently and combined for
152 school-aged children with language disorders; though given the narrative nature of the review no
153 definitive conclusions can be drawn.

154 More conclusive results come from Pyle, et al. (2017), a meta-analysis on the effects of
155 expository text-structure interventions on comprehension in school-aged children and the
156 moderators of intervention success. The studies included students from grades 2-5 and 8-12 who
157 were high-achieving, at-risk or learning disabled (LD). The results of this analysis indicated
158 significant differences between intervention effects, favoring intervention studies where: the
159 researcher administered the intervention, the length of intervention was 11-20 hours, one or two
160 text structures were targeted (i.e., cause-and-effect, compare-and-contrast), and participants were

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161 of elementary school age. This meta-analysis provided important information about the efficacy
162 of expository interventions and potential moderators (Pyle et. al, 2017). However, the studies
163 included in this review did not target middle-school aged students or students with LLD
164 specifically and 2 studies have been published in this area since 2017.

165 The current systematic review intended to examine studies that conducted an expository
166 or narrative discourse intervention for students with LLD in late-elementary and middle school
167 grades (i.e., ages 9-14). This review is important to advancing the synthesis of interventions as
168 this population is significant in both narrative and expository discourse development and no
169 other review to date specifically targets this population. Additionally, though fidelity was
170 discussed in the majority of prior reviews, focus on treatment efficacy and effectiveness through
171 near and far transfer outcomes sets this review apart from others. Fidelity information is further
172 analyzed to aid clinicians in knowing which studies have provided their intervention materials to
173 encourage systematic implementation outside of the controlled research environment.

174 Only group experimental studies that utilized a control or comparison group and
175 specifically measured an intervention were included in this review. Group-level experimental
176 designs were selected to highlight high-quality, rigorous experimental studies that provide
177 evidence-based treatments with potential generalizability to the target population. Group-level
178 experimental designs have the potential to generalize to a broader population due to the
179 homogeneity of the population, random assignment of participants to a control or treatment
180 group in the case of RCTs, and good external validity of results (Institute of Medicine, 2011). In
181 order to further analyze the quality of the included research studies, the Gillam & Gillam (2006)
182 *Critical Appraisal Standards* were used. These standards provide valuable questions for
183 researchers and clinicians to critically analyze the quality of a research study to encourage use of

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184 research in practice (Appendix A). This review addresses the following questions:

- 185 1. What interventions exist that target narrative and/or expository discourse for
186 school-aged children ages 9-14 with LLD?
- 187 2. Do interventions conducted with at least 80% fidelity produce both statistically
188 and practically significant improvements in discourse comprehension and/or
189 production?
- 190 3. Based on the Gillam & Gillam (2006) *Critical Appraisal Standards*, at what level
191 of quality were these studies conducted?

192 **Methods**

193 **Search Procedure**

194 The Institute of Medicine (2011) guidelines for conducting high-quality systematic
195 reviews were used to guide the procedure for this review. The initial search was conducted using
196 the electronic database for the American Speech and Hearing Association (ASHA), and the
197 EBSCO-hosted databases PsychInfo and ERIC. These databases were selected because of the
198 focus on education, psychology, and speech-language pathology that related to both the
199 population and intervention criteria set by the authors. Search terms were selected based on
200 relevance to the population of interest (i.e., school-aged children with LLD), discourse type (i.e.,
201 expository and narrative discourse), modality (i.e., oral and/or written), process (i.e., production
202 or comprehension), and instruction (i.e. intervention, etc.). Related terms were located using the
203 thesaurus tool in PsychInfo to expand search terms for maximum inclusivity. Boolean logic
204 asterisks were used to include all root-word variations (i.e., disab* to include disabled, disability
205 and disabilities) when appropriate systematically combined through chunking similar terms with
206 “OR” and combining terms with “AND”. Systematic searches yielded 500-1000 results per

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207 database, not accounting for duplicates. See Appendix B for the extensive list of search terms
208 used.

209 Additional studies were located through the process of ancestral searching, whereby we
210 examined reference lists of studies included for full-text review for publications that did not
211 populate in our electronic search. An expert in the field of language intervention also suggested
212 several publications as part of a researcher-to-researcher search method (Ukrainetz, T.A.,
213 personal communication, March 7, 2019). We excluded: articles that were not published in peer-
214 reviewed journals (i.e., theses and dissertations), book chapters, and studies that were published
215 in languages other than English.

216 The studies included in this systematic review met the following inclusion criteria:

- 217 1. Participants were within the specified age range i.e., (ages 9-14 or grades 4-8). To be
218 included in this review, all of the participants in the study had to be within the specified
219 age range.
- 220 2. Participants were students with LLD who had difficulties in language, reading, and
221 writing (Gerber, 1993), qualified for an individualized education plan (IEP), or were
222 considered “at-risk” for a disability by their school or state criteria. The specific
223 disabilities included under LLD are: language disability or impairment, learning
224 disability, and specific language impairment.
- 225 3. Interventions targeted narrative or expository discourse. Intervention was defined as a
226 structured activity targeting a student’s production or comprehension in the academic
227 setting directed by a teacher, clinician, or researcher. Interventions also included a
228 measurable outcome on student performance (Cirrin & Gillam, 2008).

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- 229 4. Studies reported one or more outcome measures of discourse comprehension and/or
230 production. Outcome measures of comprehension included multiple-choice or true/false
231 questions about literal or inferential information from the text and outcome measures of
232 production included written (i.e., essays, short answers) or oral presentations.
- 233 5. Studies that employed group-level experimental designs, such as a randomized clinical
234 trial (RCT) or nonrandomized comparison design (i.e., participants are matched across
235 groups) were included in this review. RCTs are considered the highest quality group-
236 experimental designs as they include control groups and higher experimental control than
237 those that include a non-randomized comparison group (Gillam & Gillam, 2006). Group-
238 level experiments produce empirically supported results and have higher external validity
239 for generalization to the broader population (Institute of Medicine, 2011). Quality
240 appraisal standards were employed to further analyze the quality of these studies as
241 recommended by the IOM (Chapter 4).

242 Methodological Quality

243 The studies included in a systematic review are rarely conducted by equal standards, thus
244 it was essential to include an indicator of methodological quality to assess implications and risk
245 of bias within studies. The Institute of Medicine recommends a quality analysis step in the
246 systematic review process to reduce the risk of potential bias and provide additional information
247 about implementation (p.178). To address quality in this review, the authors used the *Critical*
248 *Appraisal Standards* (Gillam and Gillam, 2006), adapted from Dollaghan (2004). This set of
249 eight questions was used in Cirrin and Gillam's (2008) systematic review on language
250 interventions for school-aged children with language disorders. Given the similarity of the topic,
251 these standards were appropriate for assessing the quality of studies in this review. The full list

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252 of questions can be found in Appendix A.

253 The questions included in the *Critical Appraisal Standards* (Gillam & Gillam, 2006)
254 addressed internal validity by assessing: use of a control/comparison group, random assignment
255 of participants, initial group similarities, and assessment blinding. Studies that do not meet these
256 criteria are at risk of making false causal conclusions as confounding variables cannot be ruled
257 out. External validity is addressed through a clearly defined population to increase potential
258 generalizations of treatment effectiveness and reduce over-extension of the results to untested
259 populations. Validity and reliability of measures can impact interpretation of outcomes due to
260 variations in participant-to-participant and administrator-to-administrator results. The final
261 questions addressed statistical and practical significance, which are critical to appraising the
262 intervention effect.

263 Coding Procedures

264 Records obtained from the initial search were imported to Zotero for organization and
265 categorization by discourse type. In the abstract and title screening, all records were briefly
266 examined for relevance and readily apparent inclusion or exclusion information by one of the
267 three authors and either discarded or considered for full-text review. Records obtained through
268 expert recommendation and ancestral searching were subject to the same screening process. The
269 full-text reviews were coded in REDCap (Harris, Taylor, Thielke, Payne, Gonzalez & Conde,
270 2009), a secure web-based data management system. The code sheet contained the following
271 subsections: participant information, study setting, intervention characteristics, outcome variable
272 characteristics, and study quality as described above. The coded information was categorized as
273 either a study characteristic or a potential moderating variable. Study characteristics addressed
274 participant age, disability type, discourse type (i.e., expository or narrative), modality (i.e., oral

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275 or written), outcome, and study setting. These variables were considered high-level details of
276 each study design. The moderating variables were selected based on their potential to impact the
277 degree of intervention effectiveness and were identified using previous literature reviews (Pyle et
278 al. 2017; Cirrin & Gillam, 2008). Moderating variables included: group matching procedure,
279 participant diagnosis and areas of language impairment, services provided pre-intervention,
280 length and number of intervention sessions, intervention administrator, and implementation
281 fidelity measurements. In a full-text review, articles were excluded when they failed to meet the
282 inclusion criteria. Following the full-text review, data were extracted through the coding process
283 and the REDCap output. The full coding sheet can be found in supplemental materials.

284 Objectivity was increased through forced multiple-choice questions to prevent ambiguous
285 coder responses. Before coding, each of the authors reviewed the coding form to clarify any
286 areas of confusion and ensure all critical questions were addressed. All studies were
287 independently double-coded to provide comprehensive inter-coding reliability at a threshold of
288 80%. Inter-coder reliability was calculated through item-by-item correspondence by dividing the
289 number of items scored in common by the total number of items coded. Across all articles and
290 code sheet subsections, inter-coder reliability ranged from 78.2-94.4%. Coding disagreements
291 were discussed between first and second coders on 100% of the data until a resolution was
292 reached. Discrepancies were subtracted from total number of items and percentage was
293 calculated with an average of 84.6%.

294 Effect Sizes

295 When sufficient data were provided (i.e., means, standard deviations, number of
296 participants), effect sizes were calculated and characterized as between-group difference or pre-
297 post difference statistics. Effect sizes were included to identify the practical significance of an

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298 intervention and to allow consumers to be more confident that type I or type II errors were not
299 committed. Hedge's g was selected to measure effect size because it accounts for unequal, small
300 group results better than other effect size measures (Hedges, 1981). Hedge's g was calculated
301 using a freely available, web-based effect size calculator and interpreted whereby 0.10 is
302 considered small, 0.36 is considered moderate and 0.86 is considered large (Lipsey, Puzio, Yun,
303 Hebert, Steinka-Fry, Cole, Roberts, Anthony & Busick, 2012). This interpretation is preferred
304 over more traditional interpretations, such as Cohen (1977), because it was developed from a
305 systematic review of educational studies and pertains specifically to interventions consisting of a
306 smaller set of targets within a larger curriculum (Lipsey et al., 2012).

307 Treatment outcomes were identified within the initial coding process and then
308 categorized as either near or far transfer measures by the second author based on the following
309 definitions. After initial categorization, 100% of the measures were reviewed by the first and
310 third authors to determine if any outcome had been mis-categorized. Near transfer outcomes are
311 those that directly relate to what was taught in intervention (e.g. identifying particular structures
312 in an expository text); far transfer outcomes include the application of intervention skills to other
313 contexts (e.g. assessing text structure intervention through reading comprehension on novel
314 texts) (Perkins & Salomon, 1992). Near and far transfer outcomes helped to demonstrate
315 intervention effectiveness. Systematic fidelity measures, those that measure fidelity in various
316 levels of the intervention and directly affect treatment efficacy were determined by the second
317 author and independently agreed upon by the first author. Rather than simply stating if studies
318 utilized a scripted treatment procedure, this review sought to define other fidelity features of the
319 study (i.e., session checklists, observer checklists) to evaluate efficacy and potential for
320 implementation with researcher-provided materials for clinicians.

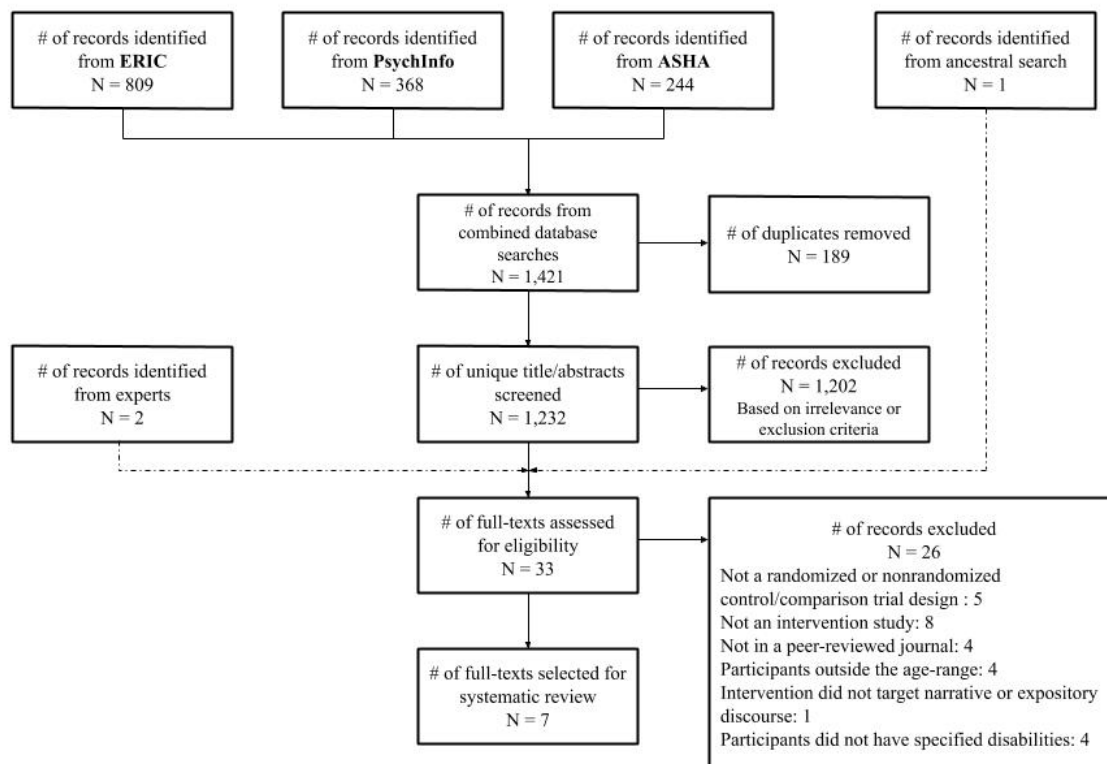
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Results

The original computer search yielded 1,232 records. Of those, 1,202 were excluded based on title and abstract screening for relevance. The ancestral search and researcher-to-researcher recommendations yielded an additional three articles for a total of 33 to be included in full-text review. Based on the full-text review, articles were excluded that: did not include an intervention ($n = 8$), did not specifically target narrative or expository discourse ($n = 1$), were not published in a peer-reviewed journal ($n = 4$), did not have participants within the specified age range ($n = 4$), did not include participants with the specified disability categories ($n = 4$), or were not group-level experimental designs ($n = 5$). The article selection process is detailed in Figure 1. Seven studies met all of the selection criteria (Table 1), summaries of which can be found in Appendix C with related terms as specified by the original authors (e.g., SLI, LLD, etc.).

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337 *Figure 1.* Flow-chart depicting the full search process.

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341 **Effect Sizes**

342 The majority of studies reported significant effects of treatment, with the exception of
343 Griffin and colleagues (1991), who did not find statistically significant effects on immediate or
344 delayed posttest measures (Table 1). Statistical significance is important when analyzing the
345 efficacy of treatment, though to better compare the study effects to one another within this
346 review, Hedge's *g* effect sizes were calculated when the appropriate information was provided
347 (Tables 2 & 3). These effect sizes were calculated to further analyze the outcome effects of
348 treatment and to provide clinicians with more evidence of the effectiveness of these treatments.
349 The majority of studies had small effect sizes with two studies having effects in the moderate-
350 large range. Scanlon (1996) had large treatment effects for participants' creation of graphic
351 organizers in both TD and LLD groups post-treatment. Ukrainetz (2019) had large effects on
352 quality of notes in "quick and easy" and "bulleted/picto" categories favoring the intervention
353 group. Outcomes measuring use of full, open/close sentences, and modified sentences were also
354 moderate-large for Ukrainetz (2019).

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356 **Table 1.** *Study Characteristics – participants, design, interventions and outcomes*
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Citation	Participants	Study Design	Intervention Type	Intervention Target	Outcome Measure	Statistical Significance
Carnine, D., & Kinder, D. (1985)	N=27 LLD or at-risk; unequal group sizes (14 generative, 13 schema) performance-level matched	Random assignment with comparison group	Generative expository discourse intervention (treatment condition) and narrative discourse (comparison condition) adopted from 3-4 grade level texts	1. Reading comprehension 2. Oral production	Rubric-based, measured pre- and posttest with follow-up	YES $p < .001$ for pre-test to transfer-test comparisons of narrative and expository comprehension and narrative retell indicating a training effect; high correlation of performance between transfer and maintenance tests
DiCecco, V. M., & Gleason, M. M. (2002)	N = 24 with LLD; equal participants, performance-level matched	Cluster randomization by school with comparison group	Graphic organizer intervention with curricular expository text	1. Expository reading and listening comprehension 2. Oral and written production	Overall performance rating, pre- and posttest	YES $p < .001$ for time of test on written measures and content knowledge for both groups; $p = .0007$ for treatment group on inclusion of relational statements at post-test

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Griffin, C., Simmons, D. C., & Kameenui, E. J. (1991)	N = 28 with LLD or at-risk; equal participants, performance-level matched	Random assignment with comparison group	Graphic organizer intervention with curricular expository text	1. Reading comprehension 2. Oral and written production	Rubric-based, measured pre- and posttest with follow-up	NO $p > .05$ for both groups at immediate and delayed posttest on oral retell, production, and choice-response measures
Hebert, M., Bohaty, J., Nelson, J. R., Roehling, J., & Christensen, K. (2018)	N = 12, with LD or at-risk; unequal group sizes (7 experimental, 5 control), performance-level matched	Random assignment with control group	Note-taking and text structure intervention with researcher-developed expository text	1. Expository reading comprehension 2. Written production	Check-list, measured pre- and posttest	YES $p < .05$ for structures, compare/contrast, and sequence writing proximal outcome measures; $p = .007$ for structures identification distal outcome measure
Starling, J., Munro, N., Togher, L., & Arciuli, J. (2012)	N = 43 with SLI; unequal group sizes (22 treatment, 21 control); matching unclear between groups	Random assignment with control group	Explicit expository language instruction for classroom teachers	1. Reading and listening comprehension 2. Oral and written production	Norm-referenced, measured pre- and posttest with follow-up	YES $p < .05$ for <i>Listening Comprehension</i> and <i>Written Expression WIAT-II</i> scores at post-test with students in treatment group outperforming control

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Scanlon, D. (1996)	N = 204, both TD and LD; unequal group sizes (109 treatment, 95 control), closely matched based on chronological age	Non-random assignment with comparison group; classrooms selected by teachers	ORDER strategy intervention with researcher-developed expository text	1. Expository reading comprehension 2. Written Production	Overall performance rating, measured pre- and posttest	YES $p < .0005$ for creating graphic organizers, favoring treatment over comparison at post-test
Ukrainetz, T. A. (2019)	N = 44, with LLD or SLI; equal group sizes, performance-level matched	Random assignment with control group	Sketch and Speak intervention with researcher-developed expository text	1. Expository reading comprehension 2. Oral and written production	Rubric-based, measured pre- and posttest	YES $p = .001$ for <i>Quick</i> and <i>Bullet/Picto</i> categories and quality of notes at post-test, favoring the treatment group

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360 **Table 2.** *Near-Transfer Measure Effect Sizes*

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Study	Name(s) of Measure	Medium	Description	Hedge's <i>g</i> Between Group Differences
Carnine, D., & Kinder, D. (1985)	Information units recalled (IUR)	Oral	Generative group instructors identified key chunks of information and discussed significance to the text. At post-test the mean number of information units recalled during expository retell were assessed.	IUR: $g = 0.175$
DiCecco, V. M., & Gleason, M. M. (2002)	Number of words written for all essays (TNW)	Written	Number of words written was calculated for each written measure to assess general writing ability.	TNW: $g = 0.114$
Griffin, C. C., Simmons, D. C., & Kameenui, E. J. (1991)	Total units recalled Total score Production & Choice	Oral	Total units recalled assessed by the number of key details identified in the oral report retell of the intervention text. Total score accounted for the importance of the unit recalled. Production and choice responses assessed comprehension of the intervention text.	TUR: $g = 0.488$ TS: $g = 0.418$ P: $g = 0.573$ C: $g = 0.539$
Hebert, M., Bohaty, J., Nelson, J. R., Roehling, J., & Christensen, K. (2018)	Structure-identification Structure notes	Written	The structure identification measure assessed ability to choose the correct type of expository structure when reading assessment text. Students were instructed to take notes on additional passages and notes were scored for the number of structures present.	S-ID: $g = 0.73$ SN: $g = 0.906$
Scanlon, D. (1996)	Creation of graphic organizer	Written	Ability to design a graphic organizer with critical information from an expository passage was assessed. Typically developing (TD) and those with LD were assessed separately for each group.	TD: $g = 1.08$ LD $g = 0.955$
Ukrainetz, T. A. (2019)	Notes quantity & quality	Written	Note quantity measured by the number of notes; quality measured through five indices: format (2), brief, sufficient and paraphrasing.	Quan: $g = 0.163$ Qual: $g = 1.199$

363 *Note.* The effect sizes are for between group differences (i.e. control/comparison group versus

364 intervention group).

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366 **Table 3.** *Far-Transfer Measure Effect Sizes*
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Study	Name(s) of Measure	Modality	Description	Hedge's <i>g</i> Between Group Differences
Carnine, D., & Kinder, D. (1985)	Expository transfer items, Inferential comprehension, Literal comprehension	Written	ETI = measure of expository knowledge transfer. Participants were administered a comprehension test that required application of learned skills including three literal and two inferential questions.	ETI: $g = 0.427$ Inferential comp: $g = 0.205$ Literal comp: $g = 0.281$
DiCecco, V. M., & Gleason, M. M. (2002)	Content Knowledge Fact Quiz	Reading comprehension	A series of 8 fact quizzes were administered throughout the intervention to assess comprehension of factual information in the text. Only the final quiz effect size is presented here.	Fact quiz: $g = 0.073$
Griffin, C. C., Simmons, D. C., & Kameenui, E. J. (1991)	None	N/A	None	N/A
Hebert, M., et al. (2018)	Structure comprehension	Written & Reading comprehension	Students answered a series of 20 comprehension questions related to a previously taught expository text.	Comprehension: $g = 0.006$
Scanlon, D. (1996)	None	N/A	None	N/A
Ukrainetz, T. A. (2019)	Full sentences Open/Close Sentences Modified sentences	Written	Measures of quality for the posttest written reports on expository texts included: use of full sentences, opening/closing statements and modifications to sentences presented in original text.	Full: $g = 0.480$ O/C Sentences : $g = 0.492$ Modified Sentences: $g = 0.640$

368 *Note.* The effect sizes listed in this table pertain to between group differences (i.e.,
 369 control/comparison group versus intervention group). No effect sizes are reported for Griffin et
 370 al. (1991) or Scanlon (1996) as they could not be calculated.

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371 **Near and Far Transfer Outcomes**

372 Coded information on transferability revealed that the majority of outcomes across
373 studies were near transfer (i.e., posttest measured ability to do what was directly taught in
374 intervention). See Table 2 for description of near transfer effects and Table 3 for far transfer
375 effects by study. Two of the studies only measured near transfer tasks (Griffin et al., 1991;
376 Scanlon, 1996). The studies that included both near and far transfer tasks had mixed effect sizes.
377 Carnine and Kinder (1985) had larger effect sizes for their far transfer tasks related to inferential
378 and literal comprehension (Table 3), compared to their near transfer task on recalling information
379 units (Table 2). Alternatively, Hebert et al. (2018) had moderate to large effect sizes on
380 experimenter-designed near transfer tasks of note taking and structure identification (Table 2),
381 but had an equivocal effect size on a far transfer comprehension task (Table 3). In general, far
382 transfer tasks are more indicative of generalization and near transfer tasks do not necessarily
383 extend beyond the intervention setting.

384 **Fidelity**

385 Of the seven studies included in this review, four of the studies reported fidelity (Table
386 4). Of these studies, only three reported 80% or higher fidelity, an important consideration for
387 treatment effects due to intervention rather than maturational effects of participants.
388 Additionally, only two of the studies that reported fidelity supplied materials or checklists for
389 clinicians to implement the intervention in practice (Ukrainetz, 2019; Hebert et al., 2018).

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390 **Table 4.** *Fidelity of Intervention Implementation*

	Systematic Intervention Administration	Checklists Provided in Publication	Fidelity Tracked	Fidelity Level	Fidelity Above 80%?
Carnine, D., & Kinder, D. (1985)	Scripted lessons	No	No	N/A	N/A
DiCecco, V. M., & Gleason, M. M. (2002)	Scripted lessons, Observer checklists	No	Yes	Not reported	N/A
Griffin, C. C., Simmons, D. C., & Kameenui, E. J. (1991)	Scripted lessons with expectation of teacher to add information	No	No	N/A	N/A
Hebert, M., Bohaty, J., Nelson, J. R., Roehling, J., & Christensen, K. (2018)	“Soft scripted” lessons, Observer checklist, Lesson-specific procedure checklists	Yes <i>Supplemental Materials</i>	Yes	92.79%	Yes
Starling, J., Munro, N., Togher, L., & Arciuli, J. (2012)	Manual for instruction, Observer checklist, Collaborative meetings	No	Yes	90%	Yes
Scanlon, D. (1996)	<i>Example</i> scripts for lessons, Session behavior checklist, Observer checklist	Not provided	Yes	21.9% (averaged across multiple measures)	No

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Ukrainetz, T. A. (2019)	Scripted introduction of new skills, Treatment fidelity checklists for interventionist and observer	Yes <i>Appendix B</i>	Yes	95%	Yes
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392 **Quality of Intervention Studies**

393 The *Critical Appraisal Standards* (Gillam & Gillam, 2006) questions are found in
394 Appendix A. Appraisal points for each study based on this evaluation of quality indicate that
395 clinicians can have moderate confidence in the results presented in this synthesis (Table 5). All
396 seven of the included studies utilized a comparison/control group within their experiment. The
397 majority of studies also earned points for statistical and practical significance of treatment and
398 for randomly assigning participants. Random assignment of participants within an experiment is
399 ideal to provide the greatest experimental control, reduce potential maturation effects, and
400 increase potential for generalization (Gillam & Gillam, 2006). No-treatment control groups, like
401 the business-as-usual control used in Ukrainetz (2019), or alternate treatment groups, like in
402 Hebert et al. (2018) can be used to examine intervention effects. Alternate treatment groups are
403 used as a more pragmatic way to provide some form of intervention to all when a no-treatment
404 option is impractical. For example, in Hebert et al. (2018) an alternate treatment was used
405 because intervention occurred after school. Scanlon (1996) is the only study in this review that
406 did not use random assignment of participants to the experimental groups, therefore not earning
407 the *Critical Appraisal Standards* (Gillam & Gillam, 2016) point for this item.

408 Many studies lost points for not describing the blinding procedures and for not using
409 previously established, valid and reliable outcome measures. Only one of the studies met the
410 “measures” appraisal value for using previously established, valid and reliable measures for
411 outcomes with Starling et al. (2012) using standardized tests at pre/post and follow-up testing
412 sessions. The highest quality interventions included in this review by these standards were
413 Ukrainetz (2019) and Starling et al. (2012), both earning 7 of 8 quality points. Ukrainetz
414 employed a business-as-usual control group, included participants with LLD who had reading

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415 and decoding impairments, and provided six intervention sessions, 30 minutes in length in a one-
416 on-one or paired group context, administered by a trained SLP (2019). SLPs in the Ukrainetz
417 (2019) study trained students on note-taking from expository texts combined with verbal
418 rehearsal of complete sentences to increase student comprehension of grade-level material
419 through a variety of ‘real student life’ discourse tasks. Starling and colleagues implemented a
420 collaborative treatment where an SLP trained classroom teachers on increasing the impact of
421 specific language instruction through: breaking down large amounts of information into smaller,
422 visually distinct sections, using picture supports, providing descriptions for new vocabulary, and
423 placing questions on the same page as the text in small group or one-on-one discussions over a
424 10-week period (2012).

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425 **Table 5.** Gillam & Gillam (2006) *Critical Appraisal Standards* points for included articles

	<i>Carnine & Kinder (1985)</i>	<i>DiCecco & Gleason (2002)</i>	<i>Griffin et al. (1991)</i>	<i>Hebert et al. (2018)</i>	<i>Starling et al. (2012)</i>	<i>Scanlon (1996)</i>	<i>Ukrainetz (2019)</i>
Control group or treatment comparisons	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Random assignment	Yes	Yes	Yes	Yes	Yes	No	Yes
Participant information	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial group similarity	Yes*	Yes*	Yes*	Yes*	No	Yes**	Yes*
Blinding	No	No	Yes	No	Yes	Unclear	Yes
Measures	No	No	No	No	Yes***	No	No
Statistical significance	Yes	Yes	No	Yes	Yes	Yes	Yes
Practical significance	Yes	No	Yes	Yes	Yes	Yes	Yes
Total appraisal points	6/8	5/8	6/8	6/8	7/8	5/8	7/8

426 *Note.* From “Making Evidence-Based Decisions about Child Language Intervention in Schools,” by S. Gillam and
427 R. Gillam, 2006, *Language, Speech, and Hearing Services in Schools*, 37. Copyright 2006 by the American Speech-
428 Language-Hearing Association. Standards adapted from Dollaghan (2004) and with permission by M. Cirrin and R.
429 Gillam (2008). *matched by performance level, **matched by chronological age, *** standardized test scores to
430 measure performance.

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432 **Potential Moderating variables**

433 No conclusive statements about the impact of moderating variables can be made given
434 the nature of this review, however, there were a number of consistent factors across the study
435 designs and implementation that may have affected outcomes that warrant future investigation.
436 Moderating variables were determined based on those identified in previous reviews (Pyle et al.,
437 2017; Cirrin & Gillam, 2008). First, studies with participants diagnosed with only one
438 component of LLD (i.e., a singular impairment in either reading or language) showed higher
439 posttest gains than those that included participants with overall academic performance
440 difficulties (i.e., participants in Carnine & Kinder, 1985). This may be due to a number of
441 factors, including the intervention itself, the group size and matching procedures, or the
442 population of students. A future meta-analysis might therefore consider evaluating the
443 number/type of impairment on responsiveness to intervention.

444 A second potential moderating variable identified was intervention dosage. The
445 interventions ranged in duration from 4 days to 19 weeks and in instructional time from 180 to
446 570 minutes. We found larger effect sizes for the interventions with a moderate dosage (i.e., 180-
447 300 minutes across 6-8 weeks). Previous reviews focused on reading interventions have found
448 larger effect sizes during shorter interventions for students with learning disabilities (Elbaum et
449 al., 2000; Scruggs et al., 2010; Pyle et. al, 2017). Our analyses determined that Ukrainetz (2019)
450 had the largest effect size and the highest quality scale rating in only 6 sessions of intervention
451 while one of the smallest intervention effect sizes came from a study that had only four sessions
452 (Griffin, 1991). Additionally, Ukrainetz (2019) found statistically significant results for outcome
453 measures while Griffin and colleagues (1991) did not. Differences in intervention length, timing,
454 and setting, make it beyond the scope of this review to discern how the length of treatment

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478 analyzed at the group experimental level for this population. The majority produced some level
479 of significant change in near transfer skills, however, far transfer effects were primarily small.

480 At the outset of this synthesis, we expected to find both narrative and expository
481 interventions because of the continued difficulty with narrative discourse in students with LLD
482 (Snyder & Downey, 1991). Despite the increased use of expository text structure in the later
483 grades, we anticipated continued treatment in both patterns of discourse for students with LLD
484 because of the potential for continued difficulty with narrative structure (Stein & Glenn, 1982;
485 Merritt & Liles, 1987). We found only one study that examined a narrative intervention for this
486 population while also targeting expository language skills (Carnine & Kinder, 1985); all other
487 studies measured outcomes in expository discourse structures. The low number of group level
488 experimental design studies on narrative intervention for this population could identify a need for
489 future research in this area.

490 Efficacy and Effectiveness of Interventions

491 To analyze the efficacy of these studies, an 80% threshold of fidelity was set by the
492 authors. Fidelity of implementation within studies is important for clinicians to be able to
493 determine that the effects of treatment were due to the intervention itself. Three studies met this
494 threshold, but only two of the studies provided access to fidelity checklists for clinicians to better
495 implement the innovation in practice (Ukrainetz, 2019; Hebert et al. 2018). The small number of
496 studies providing materials to clinicians may increase the research-to-practice gap and result in
497 limited effectiveness of interventions in real-world situations. In order for clinicians to
498 appropriately implement these interventions, an increased report of fidelity and more accessible
499 treatment materials is necessary in future studies to increase clinician implementation in real-
500 world settings. Appropriate implementation of an intervention depends on adequate researcher-

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501 to-clinician communication, investigation of core components of treatment, observations of
502 implementation in real-world situations, and active studies of research in practice through
503 implementation teams (Fixsen et al. 2019). Researchers can better address the research-to-
504 practice gap by providing examples, fidelity checklists, and materials upon request to clinicians.

505 Generalizability

506 This review generalizes to populations well-known by SLPs as students with LLD make
507 up significant portions of the caseload in a school setting from kindergarten to 12th grade. The
508 results of this review suggest that interventions for expository discourse, including instruction
509 with graphic organizers to highlight connections between main points and strategies like note-
510 taking with verbal rehearsal (Ukrainetz, 2019), can be beneficial for increasing student
511 understanding. Highly structured tasks with explicit instruction (i.e., ORDER, *Sketch and Speak*)
512 and less structured note-taking tasks used in Hebert et al. (2018) and DiCecco & Gleason (2002)
513 both benefitted students with LLD.

514 Though all of the intervention strategies were explicitly taught, there was a great deal of
515 variability in the validity of the measurements used and the amount of student carryover after
516 intervention. The amount of student progress varied significantly based on the level of explicit
517 instruction and scaffolding provided to the students. Whole class instruction provided the best
518 outcomes (i.e., largest effect sizes) for students second only to one-on-one instruction (Ukrainetz,
519 2019). The research designs included in this review were all experimental, high-quality
520 intervention studies. Some of the studies included a randomly assigned alternate treatment group
521 instead of a control group (Carnine & Kinder, 1985; Hebert et al., 2018) to provide some form of
522 intervention to all study participants. The main caveat to alternate treatment groups, however, is
523 that it becomes difficult to disentangle which posttest effects are due to the intended components

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524 of the experimental intervention, and which may be due to components common to both methods
525 of instruction.

526 Limitations

527 The usefulness of this systematic review is impacted by the strength of the research
528 designs and by factors related to publication bias. There were only 7 studies that met the criteria
529 set by the authors, limiting the possible implications of this review on intervention for the LLD
530 population. The validity and reliability of measures across treatments is also a limitation as the
531 majority of studies in this synthesis used self-developed tools to analyze performance. Only one
532 study used previously established measures by using the WIAT subtests at pre-post and follow-
533 up testing of student performance (Starling et al. 2012). Though standardized tests are valid and
534 reliable, they are not designed to measure improved performance over short periods of time in
535 most cases. Additionally, the use of different tools across studies made it difficult to compare
536 intervention effectiveness and impacted the generalizability of treatments. With replication and
537 validation of these measures through follow-up research, more informed treatment methods for
538 expository discourse may be available for clinicians in the future. Incomplete reporting of
539 descriptive statistics across studies is another potential bias that could have affected the
540 interpretation of effect sizes. Given that some studies reported incomplete descriptive statistics,
541 effect sizes could not be calculated for all outcome measures. It is possible that some authors
542 might have only reported the descriptive statistics for their most significant results; however,
543 without complete information effect sizes are unable to be determined.

544 Publication biases may have also impacted the availability of studies to be included in
545 this review. Studies with negative or equivocal results are often not published, limiting the
546 availability of research, though the degree of bias is difficult to measure. Case studies and single-

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547 subject designs are standard in speech pathology and educational research, though we decided
548 not to include them in this review due to their limited generalizability and potential for biases
549 (Institute of Medicine, 2011). Of the 33 studies examined for full-text review there were 4
550 studies excluded because of study design (e.g. quasi-experimental or case study) and 6 excluded
551 for not providing intervention specific to students with LLD. The limited availability of studies
552 with robust, group-level research designs targeting students with LLD also impacted the results
553 of this synthesis, though the *Critical Appraisal Standards* (Gillam and Gillam, 2006) helped to
554 provide information about the quality of implementation across studies.

555 When looking for empirically supported treatments beyond what are listed in this review,
556 clinicians may need to consider adapting interventions developed for alternate populations (e.g.
557 younger children or non-LLD), or consider interventions conducted at good, but lower levels of
558 experimental rigor, such as single-subject designs. Going forward, more high-quality studies in
559 the specific area of speech-language pathology would significantly increase the quality of
560 practices available to SLPs.

561 Implications for Clinicians and Clinical Researchers

562 Clinicians and researchers should interpret the effect sizes reported in this review with
563 caution. All students, regardless of ability, benefitted from explicit instruction with expository
564 texts, though the far transfer of skills into other contexts was small if available. In the majority of
565 studies included in this review, students demonstrated learning of specific strategies taught
566 during the intervention (i.e., creating graphic organizers or identifying text structures) but there
567 was minimal evidence that these skills generalized to comprehension or production measures at
568 post-testing. No study in this review used delayed follow-up testing on student independence and
569 use of strategies in other learning environments. Though the use of graphic organizers can help

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570 students with LLD to have more understanding of the connections within and across texts,
571 explicit instruction of skills beyond this is likely necessary to increase student benefit. The use of
572 explicit strategy instruction within expository texts shows promise for improved comprehension
573 of discourse for students with LLD. Additional work is needed to determine the best method for
574 teaching far transfer of skills to unlearned contexts, which continues to prove difficult for
575 children with LLD.

576 We have determined a gap in the research of narrative discourse interventions for
577 continued development and maintenance in older students with LLD that may be addressed by
578 future research. Research with younger students has demonstrated that weakness with narrative
579 discourse significantly impacts academic performance in students with disabilities (Bloome,
580 Katz, & Champion, 2003; Stein & Glenn, 1982). Evidence further suggests that narrative
581 abilities do not spontaneously develop over time for students with language impairments (Snyder
582 & Downey, 1991). Therefore, narrative intervention should not cease for older students,
583 especially if the understanding of this discourse structure is not mastered. Based on this review,
584 studies of narrative interventions in students over age 9 would improve empirically supported
585 treatments available for clinicians.

586 Finally, there is much research on the use of graphic organizers within intervention for
587 expository text structures, but it is unclear how comprehension is measured across studies. It is
588 common to use written and spoken output to determine comprehension of materials (i.e., CCSS
589 4th grade standards), though it is unclear which interventions best impact student performance
590 with discourse level information. Ukrainetz (2019) found increased student performance on oral
591 reports and comprehension of intervention materials, but these effects did not transfer to the
592 comprehension tests at post-testing with new material. Areas of future research include

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593 examining the generalizability of interventions from research to practice and determining
594 whether positive intervention effects are sustained through delayed follow-up. An increased
595 research focus on the outcome of global student performance and maintenance could increase the
596 potential of interventions for SLPs and success of students with LLD.

597

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761 Figure Legends:

762 *Figure 1.* Flow-chart depicting the full search process.

763

764 Table 1. *Study Characteristics – participants, design, interventions and outcomes*

765

766 Table 2. *Near-Transfer Measure Effect Sizes*

767 *Note.* The effect sizes are for between group differences (i.e. control/comparison group versus
768 intervention group).

769

770 Table 3. *Far-Transfer Measure Effect Sizes*

771 *Note.* The effect sizes listed in this table pertain to between group differences (i.e.
772 control/comparison group versus intervention group). No effect sizes are reported for Griffin et
773 al. (1991) or Scanlon (1996) as they could not be calculated.

774

775 Table 4. *Fidelity of Intervention Implementation*

776

777 Table 5. Gillam & Gillam (2006) *Critical Appraisal Standards* points for included articles

778 *Note.* From “Making Evidence-Based Decisions about Child Language Intervention in Schools,”
779 by S. Gillam and R. Gillam, 2006, *Language, Speech, and Hearing Services in Schools*, 37.
780 Copyright 2006 by the American Speech-Language-Hearing Association. Standards adapted
781 from Dollaghan (2004) and with permission by M. Cirrin and R. Gillam (2008). *matched by
782 performance level, **matched by chronological age, *** standardized test scores to measure
783 performance

784

785 Appendix A

786 Gillam & Gillam (2006) *Critical Appraisal Standards*

787 *Note.* From “Making Evidence-Based Decisions about Child Language Intervention in Schools,”
788 by S. Gillam and R. Gillam, 2006, *Language, Speech, and Hearing Services in Schools*, 37.
789 Copyright 2006 by the American Speech-Language-Hearing Association. Adapted from
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791

792 Appendix B

793 Table of Search Terms Used in PsychINFO

794

795 Appendix C

796 Summary of included studies using author’s terminology, organized by intervention setting

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Appendix AGillam & Gillam (2006) *Critical Appraisal Standards*

Topic	Questions
Comparison Group	Was there a control group and at least one or more treatment groups within the study?
Random Assignment	Was random assignment used to assign participants to control or treatment groups?
Participants	Was enough information provided about participants (i.e., age, gender, ethnicity, SES, speech and language abilities, and/or cognitive status) within the study?
Initial Group Similarity	Before treatment, were the groups similar on all important ways (e.g., age, ability level, etc.)?
Blinding	Were the people who administered and scored the assessments blind to which groups the participants were placed in?
Measures	Were the measures (both formal and informal) used to obtain outcomes both valid and reliable?
Statistical Significance	Were <i>p</i> -values reported that were less than 0.05?
Practical Significance	Were moderately-large η^2 values or standardized <i>d</i> measures reported? If not, can these values be calculated from the data included?

Note. From “Making Evidence-Based Decisions about Child Language Intervention in Schools,” by S. Gillam and R. Gillam, 2006, *Language, Speech, and Hearing Services in Schools*, 37. Copyright 2006 by the American Speech-Language-Hearing Association. Adapted from Dollaghan (2004) and with permission by M. Cirrin and R. Gillam, 2008.

Appendix B

Table of Search Terms Used in PsychINFO

Chunk	Term Type	String of Search Terms	Hits
S1	Discourse	Express* OR oral OR written OR production OR spoken OR “oral communication” OR “oral reading” OR “written communication” OR “written language” OR discourse OR text	392,577
S2	Discourse	Receptive OR comprehension OR understanding OR “comprehension test”	362,169
S3	Discourse	Narrative* OR expository OR information OR stories OR story OR essay* OR storytelling OR “essay testing”	513,885
S4		S1 AND S2 AND S3	37,466
S5	Intervention	Teach* OR instruct* OR intervention* OR treatment* OR framework* OR educat* OR “teaching method” OR “individualized instruction” OR “programmed instruction” OR therapy OR “treatment outcome”	1,745,441
S6		S4 AND S5	2,759
S7	Participant	Child* OR “school-age” OR elementary OR “elementary education” OR “elementary school student” OR “middle school” OR “junior high” OR “middle school education” OR “middle school student” OR “junior high school student”	754,730
S8	Participant	Impairment* OR disabili* OR disorder* OR delay* OR disabled OR disadvantaged OR “delayed speech” OR “delayed development”	684,206
S9		S7 AND S8	163,736
S10		S4 AND S5 AND S9	536

Appendix C

Summary of included studies using author's terminology, organized by intervention setting

Classroom-Based Interventions

Scanlon et al. (1996) taught students to organize essential information into a graphic organizer to target reading comprehension and written production of expository texts. The researchers used a non-randomized quasi-experimental design where whole classrooms were assigned to treatment (109 students) or control (95 students) groups. Classrooms in both groups included both typically developing (TD) students and those with learning disabilities (LD). Students within the experimental group were taught to use the ORDER strategy which involved five steps: 1) open your mind & take notes, 2) recognize the structure, 3) design an organizer, 4) explain it, and 5) recycle it. The students were also taught four major expository text structures including sequence, compare/contrast, descriptive, and problem-solution. FLOW was a sub-strategy within step 3 that helped students create a graphic organizer and included: (1) finding and listing important information, (2) looking and checking for appropriate text structure, (3) organizing the information using numbers or symbols, and (4) working out an organizer to create the final visual product. These strategies were taught by familiar teachers in 4, 25-minute lessons using expository texts from their general curriculum in history or social studies. Originally, teachers agreed to teach one 25-minute session per week for the remainder of the school year, though this was not completed by most of the teachers and likely impacted student performance at post-test. Several materials were included to facilitate proper instruction of the intervention at the classroom level, including an instruction manual containing descriptions of both the FLOW and ORDER strategies, practice activities, transparent sheets for overhead projection, posters for the classroom, and graphic organizer checklists. The authors reported statistically significant

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differences favoring the experimental group on the creation of graphic organizers ($p < 0.005$) with no interaction ($p > 0.05$) between condition and group, TD or LD. They proposed that this was an effective strategy to improve comprehension of expository text, especially for students with LD, if provided with explicit instruction.

Starling et al. (2012) conducted a classroom-based study of a collaboration intervention for speech-language pathologists (SLPs) and general education classroom teachers in two secondary-education schools randomly assigned to treatment or control conditions. The goal of the intervention was to: increase teachers' use of explicit instructions, increase repetition and rephrasing of information, and allow for increased student processing time. Teachers in the intervention condition participated in a training program led by the SLP once a week for 50-minutes over 10 weeks. SLPs taught teachers to break down large amounts of information into smaller, visually distinct sections, use picture supports, provide descriptions for new vocabulary, and place questions on the same page as the text in small group or one-on-one discussions. The SLP also observed at least three class periods where the teacher implemented the new strategies. Visual planners and outlines of the task sequence were used to aid in student production and teachers provided direct vocabulary instruction based on a three-tier vocabulary system. Performance measures were conducted for experimental group teachers at pre, post, and follow-up using a structured face-to-face interview with the Levels of Use tool (i.e., LoU) adapted from the Concerns-Based Adoption Model (CBAM; Hord, Rutherford, Huling-Austin, & Hall, 2006) to measure change in 7 distinct areas of instruction for each teacher. A total of 43 students with language impairment (21 treatment, 22 control) were given standardized spoken and written examinations at pre, post, and follow-up to measure intervention outcomes. Students within the treatment classrooms made significant improvements on written expression ($p = 0.02$) and

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listening comprehension ($p = 0.033$) as measured by subtests of the Wechsler Individual Achievement Test, Second Edition, Australian Standardised Edition (WIAT-II; Wechsler, 2007). There were no significant changes on the oral expression ($p = 0.429$) and reading comprehension subtests ($p = 0.833$) compared to the control students.

Small Group Interventions

DiCecco & Gleason (2002) taught students with LDs to use graphic organizers (GO) within a common grade-level social studies textbook. The students ranged in age from sixth to eighth grade (mean age of 13.5). The study included 24 participants randomly assigned to either the GO ($n = 12$) or no-GO ($n = 12$) condition. Participants were further assigned to small groups of 4. The intervention was conducted in resource rooms by trained special education teachers with varying levels of professional experience. Students in the experimental groups were instructed during a typical 40-minute class period each day for a total of 20 school days. Instruction included explicit, visual and verbal representations of relationships and details (i.e., instruction on graphic organizers displayed for the group) from the texts while the teachers read the texts aloud. The no-GO group was performance matched and given the same, scripted instruction and explicit verbal review, but did not receive a visual representation of details during the review session. Outcomes were measured with content knowledge multiple-choice tests administered pre and post-treatment, content quizzes throughout intervention, and two domain knowledge essays. The results indicated a statistically significant posttest difference on the number of relational knowledge statements in written essays ($p < 0.005$) with the GO group outperforming the no-GO group. Meaning that participants who received intervention with the GO made more connections within the text than those who were not trained on GOs. The authors hypothesized that the quizzes and tests may not have been equivalent, citing better student

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performance regardless of group on certain tests with some topics being more accessible for students than others.

Carnine & Kinder (1985) compared schema-based (n=13) and generative (n=14) teaching methods for increasing comprehension of expository and narrative texts in grades 4-6. Students were referred by teachers to the study because of comprehension difficulties and ranged in performance from TD to “mildly handicapped” based on district qualification. Experienced teachers provided the intervention in 20-30 minute small group sessions (i.e., 3-5 students) 3-4 times per week for a total of 32 sessions. There were nine expository text lessons in which students read one text aloud together sentence-by-sentence and 10 narrative lessons with three texts: one teacher read-aloud, one student read-aloud, and one read silently each session. Outcome measures were based on comprehension test performance. The authors predicted that the schema group would outperform the generative group in both narrative comprehension and expository maintenance on transfer items based on previous studies, however no statistically significant group differences were found, $p > 0.05$.

Griffin et al. (1991) taught late elementary school-aged students with learning disabilities to use graphic organizers (i.e., GOs) to improve reading comprehension and recall of information from scientific expository texts. The study included 28 participants with identified LD, matched by performance level, and randomly assigned to either GO intervention or comparison groups. Two experienced special education teachers acted as the treatment administrators. Participants were taught in 4 consecutive, 45-minute sessions on a text about fossil fuels, regardless of condition. The students in the GO condition were provided with visual aids to highlight and explain relationships between critical facts from the text, while the no-GO group was given a bulleted list of the same facts. Outcomes were measured through oral retells, written response

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items (i.e., fill in the blank or short answer), and multiple-choice questions on the learned material. The authors reported non-significant post group differences between GO and no-GO conditions, $p > 0.05$.

One-on-One or Paired Intervention

Hebert et al. (2018) taught late elementary school-aged children with LD note-taking and text-structure identification strategies to improve expository text comprehension and subsequent written production. Twelve participants were randomly assigned to the expository text intervention ($n=7$) or to an alternate treatment group targeting narrative discourse ($n=5$) with one-on-one or paired group instruction. Expository text intervention was administered through two lesson modules: identifying expository text-structures and taking notes centered on those structures. Students in the alternate treatment group were taught to make predictive inferences in narratives and to write short stories from picture prompts. Twice weekly sessions, approximately one hour in length, were administered for 4 weeks (total of 15 treatment sessions) on a university campus. Outcomes were measured through: participant identification of text-structure type in a reading passage, number of idea units related to text-structures in notes, and a multiple-choice reading comprehension task. The authors reported non-significant group differences on all outcome measures, $p > 0.05$.

Ukrainetz (2019) taught students to take notes and verbally rehearse using information from expository texts. This study strategy combination, *Sketch and Speak*, was designed to enhance expository comprehension and reporting skills in late elementary school-aged students with LLD. A total of 44 participants matched on performance-level were randomly assigned to either the intervention or control group and balanced to include 9 SLPs with varying levels of experience as treatment administrators. Students in the intervention group ($n=22$) received

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treatment in 30-minute sessions twice a week for 3 weeks in one-on-one or paired treatment setting (total of 6 sessions). The majority of students received one-on-one intervention with only two sets of pairs due to SLP time constraints. Following a guided read-aloud from a trained SLP, participants created brief pictographic notes to represent essential information and then generated a complete verbal sentence about the pictograph. A second session with each topic was focused on creating bulleted notes from the pictographic notes and re-generating complete verbal sentences. All sessions ended with a full oral report to increase ownership of material after cycling through reduction and expansion through note-taking. Participants in the control condition were provided “business-as-usual” services throughout the study. Outcomes were measured through the quantity and quality of notes and holistic quality of oral reports at posttest. A different expository topic was used at testing to evaluate generalization of skills to untrained topic areas. The author reported statistically significant group differences for the quality of notes ($p = 0.001$) favoring the intervention group, though differences in quantity and holistic oral quality were not significant.