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Reading comprehension interventions for elementary school students with learning disabilities: A systematic review

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Abstract

The purposes of this review were: (1) to synthesize and evaluate studies conducted to examine the effects of various interventions on reading comprehension performance of elementary students with learning disabilities (LD), and (2) to identify and describe the interventions used in the studies included in this systematic review. The second purpose was Through rigorous systematic searching procedures, 16 studies conducted between 2015 and 2025 were identified and included in their systematic review. The studies' methodological aspects (e.g., participants characteristics, settings, fidelity of implementation) were coded into two tables in order to evaluate the overall quality of studies and major findings. The overall results indicated that studies' interventions have shown significantly positive and promising effects on reading comprehension performance of elementary school students with LD. The major findings revolved around enhancing the studies' methodological quality, replications, and adhering to research standards published by the Council for Exceptional Children (CEC) in order to build evidence-based reading comprehension for students with LD. The overall limitations, recommendations, and future directions are posed and discussed.

Keywords: Learning disabilities, Reading comprehension, Elementary students, Special education, Systematic review

Introduction

Reading is the cornerstone of education (Sulaimon & Schaefer, 2023) since it is the main vehicle to learning and accessing academic content (Sohn et al., 2023), Reading is the main factor in academic success since it is the primary key in acquiring knowledge, thus it play a great role in students' school life (O'Connor & Vadasy, 2011; Özbek & Ergül, 2022). One of the most common findings in education research is the positive correlation between reading proficiently and success in school and work settings (Landa & Barbetta, 2017; Görgün & Melekoğlu, 2022). Therefore, the criticality of reading it still relevant, especially at the elementary level, since future success depends significantly on reading proficiency at early grades.

Although reading is essential skill for all students, some students, especially students learning disabilities (LD), still struggle with reading-related tasks. In fact, students with LD are commonly referred to special education because of reading difficulties (Landa & Barbetta, 2017). The National Center for Learning Disabilities (NCLD, 2014) reported that the most prevalent issue for students with LD is reading skills. Based on a national survey Cortiella and Horowitz (2014) reported that many students with LD were performing below their grade level. The National Assessment of Educational Progress (NAEP, 2019) reported that 85% of students with LD read below proficient level in reading, which negatively affect their academic performance in content areas (e.g. science, social studies, history). Therefore, only 70.8% of students with LD graduate from high school with regular diploma, and the dropout rate of the students with LD was roughly 18.1%, which was three times more than their peers without disabilities (6.5%) (National Center for Learning Disabilities, 2017).

The aforementioned reported statistics are alarming since students with LD spend most of their times in general education classrooms, so they are expected to meet the academic demands like their peers with disabilities (Berkeley & Larsen, 2018). In order to meet such academic expectations, these students do not need to only to read but they also need to understand what they read in order to acquire the knowledge needed to succeed in the taken courses. However, students with LD commonly struggle with reading comprehension-related tasks, especially at the elementary level, which hinders their current

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learning growth and future academic success.

Reading comprehension, which can be defined as extracting and constructing meaning from a text (Ciullo et al., 2016), is the most critical skill in educational settings (Wood et al., 2018). It is a fundamental skill that empowers students to access and understand complex texts (Boardman et al., 2016) and acquire knew knowledge (Scammacca et al., 2015). Reading comprehension entails many skills, which includes but not limited to decoding fluently, recognizing words (background knowledge), identifying the main idea, and inferring meaning from texts (Grünke et al., 2024; Hall-Mills & Marante, 2025). Therefore, students with LD's overall success depends mainly on their reading comprehension proficiency (Yılmaz & Melekoğlu, 2024). Regardless of the significance of reading comprehension, as previously mentioned, students with LD typically struggle with reading comprehension-related tasks.

Challenges with reading comprehension for students with LD are due to many factors. These factors include but not limited to insufficient decoding skills, inadequate awareness of text structure, limited background knowledge, and deficits in working memory capacity (Leonard et al., 2007; Hall-Mills & Marante, 2022; 2025; McMaster et al., 2014). The aforementioned issues and problems hinder those students from identifying the main idea of a text, recalling information, forming a mental representation of texts, engaging effectively with written materials, and inferring a meaning form what they read (Grünke et al., 2024; Yılmaz & Melekoğlu, 2024). Given these challenges, reading comprehension can become a frustrating and complex experience for students with LD (Stevens et al., 2017; Wood et al., 2018), which leads to low academic performance across subjects (Landa & Barbetta, 2017). Given the aforementioned reading comprehension challenges, researchers have tried to address such challenges through identifying reading comprehension interventions and solutions.

Related Literature

Seeking to support researchers, practitioners, and policymakers, concerned researchers conducted literature reviews, meta-analysis, and syntheses of studies that examined the effects of reading comprehension interventions for students with LD; through synthesizing and evaluating the literature, those researchers identified evidence-based reading comprehension practices for students with LD. In 2015, Scammacca et al. conducted a meta-analysis to summarize and evaluate 12 studies conducted between 1980 to 2011 to examine various interventions on reading outcomes for 4th-12th-grade struggling readers. The findings revealed the following: (1) an overall moderate effect size of interventions (ES= 0.49) on reading outcomes, (2) a moderate positive effect of interventions on reading comprehension performance and skills (based on 72 effects from reading comprehension measures), and a small mean effect size (ES= .21) of standardized measures.

In addition, Ciullo et al. (2016) synthesized 18 studies conducted between 1984 to 2009 to evaluate the effectiveness of interventions designed to enhance learning from informational texts for elementary school students with learning disabilities (K-5). Through the synthesis, the authors identified three types of interventions: content enhancement tools (graphic organizers), cognitive strategy training, and project-based learning. They also found moderate to large effect sizes among interventions included in this review. They also indicated that effect sizes were moderate to large whether interventions were delivered by researchers (ES = 0.38-1.83) or teachers (ES = 0.37-1.91), meaning the type of intervention agent (researcher vs. teacher) did not significantly affect students' outcomes. Stevens et al. (2017) synthesized 19 studies conducted between 2001 and 2014 to examine the effects of reading fluency interventions on reading fluency and comprehension outcomes of K-5 students with learning disabilities. The results revealed that repeated reading (RR), multicomponent interventions, and assisted reading with audiobooks significantly improved reading rate, accuracy, and comprehension outcomes. They authors indicated that the study's results were limited since only one study met the What Works Clearinghouse (WCC) standards (Institute of Education Sciences, 2014).

Using What Works Clearinghouse (WCC) standards (Institute of Education Sciences, 2014), Kim et al. (2017) evaluated the evidence base of 12 studies conducted between 1980-2015 to examine the effect of computer-assisted instruction (CAI) on reading

comprehension of K-12 students with learning disabilities. After investigating the methodological rigor of the studies included in this review, only seven studies met the design the WWC standards with or without reservations, and these studies demonstrated positive effects on reading comprehension. However, the studies overall had limited information related to fidelity, interventionist characteristics, or description of intervention and CAI instructional features. Kim et al. (2017) concluded that: CAI may have potentially positive effects on reading comprehension of students with LD. Further, Berkeley and Larsen (2018) reviewed reading comprehension interventions for students with learning disabilities. They specifically targeted 18 studies that included self-regulated components and conducted between 1985 and 2016; The overall mean effect size of reviewed studies was large (ES= .96), whether immediately after instruction and after a times delay (follow-up). They also concluded that studies containing self-regulated components within their reading instruction can have long-lasting impact since students are more likely to keep utilizing strategies for a long time after the intervention.

Wood et al. (2018) meta-analytically evaluated 22 studies that examined the impact of text-to-speech and related read aloud tools on reading comprehension of students with difficulties. The findings indicated a moderate weighted effect size (d= .35), and that text-to-speech/read aloud tools had a significant positive impact on reading comprehension outcomes of students with reading disabilities. The moderator analyses identified one significant moderator, study design; the average weighted effect size for between-subject studies was medium (d= .61), while it was small (d= .15) for within-subject studies. Four years later, Hall-Mills and Marante (2022) systematically reviewed nine studies that examined the effects of explicit text structure on expository text comprehension for secondary students with learning disabilities or at risk for reading failure. Through reviewing and evaluating the aforementioned studies, which were conducted between 1997 to 2019, the results revealed that most studies' effect sizes were large, and the effects ranged from small to large (d = 0.31−2.17). Text structure instruction, overall, was more effective than typical instruction or business in improving adolescents with learning disabilities' reading comprehension performance. Finally, Sohn et al. (2023) conducted a meta-analysis to evaluate 37 intervention studies conducted between 1982 and 2021 to examine the overall impact of reading interventions on reading comprehension performance of secondary struggling readers (grades 6 to 12). Through analyzing the 97 effect sizes (extracted from the studies), the results revealed a moderate effect (g= .63) of interventions on reading comprehension outcomes of adolescents with reading difficulties. A further meta-regression analyses indicated that the following significant moderators were associated with intervention effectiveness: text content, duration of intervention, agent of intervention, status of student, type of dependent measure, and study quality.

Rationale and significance

Roughly four decades since studies have asserted that reading comprehension is the most demanding and challenging reading skill for students with LD (Boardman et al., 2016). These challenges can negatively affect students with LD's academic outcomes. At the elementary level, having reading comprehension-related issues can be significantly more damaging. To illustrate, the majority of elementary school students with LD study in general education classrooms; therefore, they have to meet the academic expectations like their peers without disabilities. However, having low performance in reading comprehension prevents those students from acquiring knew knowledge from school subjects, which does not only hinder from meeting the academic expectations, but it can further delay their reading development and growth during the first stages of learning, specifically during primary school years (Görgün & Melekoğlu, 2022).

Delaying the reading development during primary school years can ultimately jeopardize students with LD's future academic achievement and success (Grünke et al., 2024) since they shift from learning to read to reading to learn once they enroll in secondary schools. This can widen the achievement gap between students with LD and their peers without disabilities, especially during secondary schools, where schools' expectations become more challenging and demanding (Kim et al., 2017). Having low academic scores and achievement can prevent those students from transitioning to undergraduate studies or employment since they do not have the

necessary skills to succeed to such settings. Therefore, elementary school students with LD need more academic support and reading comprehension interventions that enable them to engage with texts, acquire knowledge, and thrive in schools.

In response to such need, as per the aforementioned related literature, researchers have tried to identify interventions that can support students with LD with reading comprehension tasks. Previous literature reviews, syntheses, and meta-analyses have identified effective interventions for those students, such as content enhancement tools (graphic organizers), cognitive strategy training, and project-based learning (e.g., Ciullo et al., 2016), repeated reading (e.g., Stevens et al., 2017), computer-assisted instruction (CAI; Kim et al., 2017), and text-to-speech technology (Wood et al., 2018). However, we still need more updated systematic reviews that can identify the most current practices and interventions that support elementary school students with LD with reading comprehension-related tasks, before, during, and after reading. This systematic review, therefore, focused on studies conducted between 2015 to 2025 in order help practitioners, researchers, and policymakers find the most current reading comprehension practices for elementary students with LD.

Purpose and research questions

The purpose of this systematic review was to synthesize and evaluate studies conducted between 2015 and 2025 to examine the effects of interventions on reading comprehension performance of elementary students with LD through addressing the following research questions:

- What specific types of interventions and practices have been investigated to enhance reading comprehension performance of elementary school students with LD?
- How effective were the interventions in improving reading comprehension performance of elementary school students with LD?

Methods

A systematic search comprising electronic, hand, and ancestral searches was conducted of studies conducted from 2015 to 2025 to examine the effect of interventions on reading comprehension performance of elementary students with LD. The year 2015 was chosen for two reasons: (1) no systematic review since 2015 has mainly focused on the effect of reading comprehension practices for elementary school students with LD and (2) to update the special education field about the latest and most recent interventions targeting reading comprehension outcomes for elementary school students with LD.

Article selection procedures

To identify studies conducted to examine the effect of interventions on reading comprehension performance among elementary school students with LD, two rounds of systematic electronic searches were conducted. The first was conducted using the following EBSCO's databases: Academic Search Ultimate, ERIC, and Education Source, which yielded 866 articles. The second was conducted using Google Scholar, which yielded 153 articles. In order to find the relevant studies, the following search terms were used: reading comprehension and learning disabilities. The search terms were limited to only those two search terms in order to ensure that all relevant studies can be identified and included in this systematic review. The total number of articles found in the electronic search was 1019 articles. The titles and abstracts of these articles were read to identify which articles should be read in full. Reading the titles and abstracts resulted in a total of 383 articles to be subjected to a thorough comparison to the inclusion criteria.

For hand search, issues of the following journals published between 2015 and 2025 were searched: School Psychology Review, Journal of Learning Disabilities, Remedial and Special Education, Journal of Behavioral Education, Journal of Research and Development in Education, Exceptional Children, Rural Special Education Quarterly, Learning Disabilities Research & Practice, Education and Treatment of Children, and Reading & Writing Quarterly. The hand search yielded 48 additional articles to be screened. An ancestral search of the articles included in the review plus 42 syntheses, literature reviews, and meta-analyses was conducted to find relevant articles. The hand search yielded two additional articles. Both the hand search and

ancestral searches yielded additional 50 more articles. The final number of articles to be read in full and subjected to inclusion criteria was 433.

Inclusion criteria

First, only studies that utilized quantitative designs (e.g., experimental design, quasi-experimental, and single-subject design) were included in this systematic review. Studies that utilized single-subject designs, however, must have a graphic display of outcome data since graph displays help with determining the effectiveness of an intervention in regard to variability, trend, and level. Therefore, qualitative design studies (e.g., Boelé, 2017), practitioner papers (Spear-Swerling, 2016), observation research (e.g., Ciullo et al., 2019), and reports were excluded from this systematic review. Second, the participants had to be elementary school students with LD. If they the study included various participants, it had to separately indicate or state the number of elementary school students with LD. Further, studies had to indicate that those students were identified with LD. If they included struggling readers (Barth et al., 2022), those with reading difficulties (e.g., Vaughn et al., 2022), or at risk for LD (Kjeldsen et al., 2019) without stating they are identified with LD, they were excluded. Articles that reported studies conducted at the secondary level (Author, 2022), college level (e.g., Cardona, 2024), did not include students with LD, or did not report the number of elementary school students separately (e.g., Sanders et al., 2021; Kaewsaeng et al., 2022) were excluded.

Third, studies including participants other than students with LD (whether students with or without disabilities) had to report the results of students with LD separately. If a study included participants other than students with LD without disaggregating results for all students including those with LD (Leidig et al., 2018; Jam et al., 2018), it was excluded. Fourth, articles had to be published in peer-reviewed journals. Therefore, books, book chapters, dissertations (e.g., Alshikhi, 2023), monographs, and papers published in conference proceedings were excluded due to the lack of external peer-referee procedures. Fifth, studies had to be written in English. The articles identified but written in other languages (e.g., Muhaidat & Al-Smadi, 2021) were excluded. Sixth, reading comprehension had to be a dependent variable (DV). If there was another dependent measure in addition to reading comprehension, the study was included. However, studies were excluded if they did not have any measure of reading comprehension. Seventh, group design studies had to have a control group; therefore, group design articles without a control group were excluded. Of the 433 articles, 16 articles met the inclusion criteria and were included in this systematic review. Figure 1 demonstrates the thorough procedures followed to identify the articles.

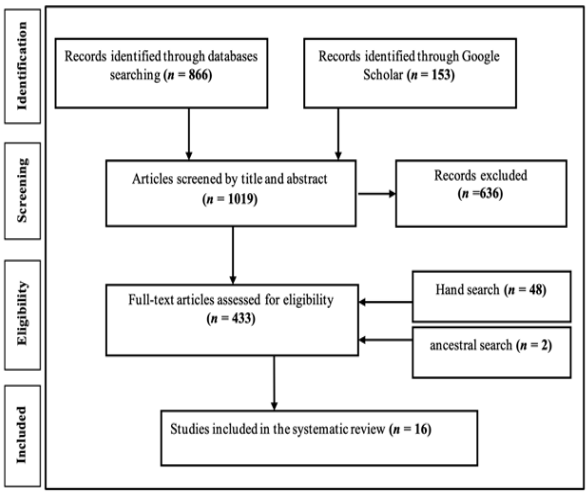

Fig 1. Flowchart of searching procedures and steps to identify articles

Coding procedures

To extract the information needed in order to answer the research questions of this systematic review, two tables were constructed. The first table contained a summary of the intervention studies including the following elements: participants number/grade, average age, gender, setting, design, duration of intervention, implementer, implementation fidelity, and social validity. The second table comprised of the results of the group and single-subject design studies, which included the following aspects: intervention type, baseline/control group instruction, measures, studies' findings, and maintenance or follow-up results. It should be noted that no information was included about the dependent variable since it is given that the DV of the studies included must be reading comprehension.

Results

In this section, the studies' characteristics are

presented, including participants' characteristics (number, age, gender) as well studies' setting, design, intervention duration, implementer, fidelity of implementation, and social validity (Table 1). Then, studies' results are presented, including type of intervention, baseline/control group instruction, measures, overall findings, and maintenance/follow up of interventions (Table 3). The tables were constructed intentionally in order to serve and answer the questions of this systematic literature review.

Overall studies characteristics

Participants characteristics

Across the 16 studies, 278 students participated in the studies included in this systematic review. The majority of studies (n= 12) were conducted in fourth grade classrooms, followed by third grade (n= 6 studies), fifth grade (n= 5 studies), second grade (n= 2 studies), while only one study was conducted within sixth grade classrooms. It should be noted that in Arab schools, elementary schools include six grade levels, unlike schools in Western countries (commonly five grade levels). Only one study (Grünke et al., 2015) did not report the participants grade level. No studies were conducted in the kindergarten or first grade levels. It is understandable since LD are not commonly identified in early grade levels.

The overall mean age of participants across studies was 10 years old. All studies reported the participants' age, except one study (Yılmaz & Melekoğlu, 2024). Regarding gender, the studies included 90 males and 81 females, who did not represent the overall number of participants (n= 278). Three studies (Atmaca & Yıldız-Demirtaş 2023; Boardman et al., 2016; Yılmaz & Melekoğlu, 2024) did not report any information related to participants' gender, meaning the gender of 107 participating students was not reported.

Setting

Although the majority of students with LD are commonly included in inclusive settings or general education classrooms (GEC), the majority of studies were conducted outside such settings. Only four studies took place in GEC, while was equal with the number of studies conducted in resource rooms (RR; n= 4), while two studies were held remotely. The rest of the studies (each n= 1) were conducted in special education classroom, private classroom, pull-out room, and special education and rehabilitation center. One study (Görgün & Melekoğlu, 2022) interestingly was held in students' homes, while only one study (Grünke et al., 2015) did not report the study setting.

Design

Four studies used group designs while 12 studies utilized single-subject designs. Of the four group design studies, two studies employed pretest and posttest control-treatment designs, while one study utilized randomized pretest and posttest control-treatment design, and one used multisite cluster randomized control trail design. The majority of single-subject design studies (n= 7) utilized multiple-baseline across participants design, followed by probe design (n= 2), two changing criterion (n= 2), while only one study utilized reversal design (A-B-A-B withdrawal). Noticing that the majority of studies utilized single-subject designs indicates the increasing popularity and adaptions of single-subject designs among special education researchers.

Duration

The average number of sessions was roughly 27 sessions. For group design studies, average number of sessions was approximately 23 sessions, while it was 25.5 sessions for single-subject design studies. Overall, the average duration of intervention sessions was about 25 minutes. The intervention sessions of group design studies lasted roughly 22.5 minutes, while they around 21 minutes for single-subject design studies. From the aforementioned average durations, it is notable the group and single-subject design studies have almost similar number of sessions and durations.

Implementer

A considerable number of studies (n= 11; 68.75%) were conducted by researchers. Three studies were administered by teachers (two by special education teachers and one by a general education teacher). The remaining of studies (n= 2) were conducted by graduate students.

Implementation fidelity

Across the studies, 11 studies reported the fidelity of implementation, while the remaining (n= 5) did not. Among the studies that reported implementation fidelity, the majority (n= 5) used direct observations using a checklist, while four studies utilized audio recordings of sessions. The remaining studies utilized developed scripted instruction (n= 2), rating checklist (n= 2), teacher logs (n= 1), and video conferencing (n= 1).

Social validity

Ten studies (62.5%) reported the social validity procedures, while six studies did not. Seven studies conducted interviews, and the remaining (n= 3) administrated surveys to gauge participants' perspectives and perceptions. Social validity was conducted with students in seven studies, with teachers in four studies, and with parents in three studies. The purposes of social validity were to understand students', teachers', and parents' satisfaction with, perceptions of, ideas about, and views of the studies' intervention.

Table 1. Summary of reviewed studies

Study	Participants N/grade	Average Age (years)	Gender	Setting	Design	Duration	Implementer	Implementation fidelity	Social validity
Atmaca & Yıldız-Demirtaş (2023)	16 4th-grade	9	NR	SPED class	Experimental PPCT	12 sessions (6 weeks)	Researcher	NR	Interview (students' and teachers' perception and satisfaction)
Boardman et al. (2016)	87 4th- and 5th-grades	10.5	NR (for students with LD)	GEC	Multisite cluster RCT	28 50-min sessions	General education teachers	Teacher logs (dosage) Observation using checklist (quality and program differentiation)	NR
Görgün & Melekoğlu (2022)	5 2nd to 4th-grades	8.8	2 F 3 M	Students' homes	Changing criterion	23 sessions	Researcher	NR	Interview (parents' and teachers' perception and satisfaction)
Grünke et al. (2015)	5 students	9.2	2 F 3 M	NR	MB	18 sessions (B & MA: 15-min, I: 30 min)	2 Graduate students	NR	NR
Grünke et al. (2024)	3 5th-grade	11.5	2 F 1 M	RR	MB	B: 3-5 15-min sessions I: 10-12 45-min sessions	Graduate student	Video conferencing, Rating checklist	Interview (students' perception and satisfaction)
Hall-Mills & Marante (2025)	4 5th-grade	11.8	2 F 2 M	Telepractice (remotely due to COVID-19)	MB	B: 5 30-min sessions I: 8 45-min sessions MA: 2 30-min sessions	Researcher	Developed scripted instruction, Checklist, Audio recordings	Survey (students' perception and their ability to use the strategy)
Jozwik & Douglas (2017)	4 4th-grade	9.7	1 F 3 M	GEC	MB	29-39 30-min sessions (per participant)	Researcher	Direct observations using checklist (average= 95.5)	Interview (students' perception and satisfaction)
Jozwik et al. (2019)	4 5th-grade	11	1 F 3 M	GEC	MP	61 days (32-min)	Researcher	Direct observations using checklists, scripted lesson plans	Survey (students' perception and satisfaction)
Kemp (2017)	3 4th-grade	9.8	1 F 2 M	RR	MB	34 7 to 15-min sessions	SPED teacher	NR	NR
Khasawneh & Abu Al-Rub	104 3rd to 6th-grades	9.5	52 F 52 M	RR	PPCT	30 25-min sessions	Researcher	NR	NR

Study	Participants N/grade	Average Age (years)	Gender	Setting	Design	Duration	Implementer	Implementation fidelity	Social validity
(2020)									
Landa & Barbetta (2017)	4 3rd to 5th-grades	10.5	3 F 1 M	Pull-out room	MP	60 10 to 20-min sessions	Researcher	Audio recordings (average= 99.78%)	NR
Okur & Aksoy (2025)	26 3rd- and 4th-grade	9.5	11 F 15 M	Remotely	Randomized PPCT	24 25-min sessions	Researcher	Reviewing sessions using checklist	NR
Özbek & Ergül (2022)	4 4th-grade	9.6	1 F 3 M	Private classrooms	MB	40 25-min sessions	Researcher	Reviewing and evaluating audio recordings using forms (average= 99%)	Interviews (students', parents', and teachers' ideas, views, and expectations of the intervention)
Sulaimon & Schaefer (2023)	2 4th-grade	11	1 F 1 M	GEC	reversal design (A-B-A-B withdrawal)	30 30 to 35-min sessions	Researcher	Direct observations using checklist	Survey (students' perception of the effectiveness of intervention)
Yılmaz & Melekoğlu (2024)	4 2nd to 4th-grades	NR	NR	A special education and rehabilitation center	changing criterion	18 40-min sessions	Researcher	Reviewing and evaluating audio recordings (average= 97)	Interviews (students', parents', and teachers' perception of and satisfaction with the intervention)

Note. B= Baseline; F= Female; GEC= General Education Classroom; I= Intervention; M= Male; MA= Maintenance; MB= Multiple Baseline RR= Resource Room; MP= Multiple Probe; NR= Not Reported; PPCT= Pretest and Posttest Control-treatment; RCT= Randomized Control Trail; RRCT= Researcher-developed Comprehension Test; SPED= Special Education

Types of interventions and findings

Interventions and practices

Across the studies, various interventions and practices were utilized and implemented. Table 2 provided the intervention and description of each intervention.

Table 2. Description of studies' interventions

Study	Intervention	Description
Alqahtani (2021)	Reread-Adapt and Answer-Comprehend (RAAC) iPad (text-to-speech)	RAAC: Research-based reading intervention that addresses fluency by repeated reading and addresses reading comprehension by teaching meta-cognitive strategy. Text-to-speech: type of assistive technology that reads texts aloud.
Atmaca & Yıldız-Demirtaş (2023)	Cognitive enhancement training (COGENT) program	An intervention program that focuses on improving the cognitive skills that are essential for reading, writing, and academic learning; it includes five modules that enable students to interpret, remember, manipulate, and use information
Boardman et al. (2016)	Collaborative strategic reading (CSR)	A research-based practice that helps students monitor their comprehension performance while working within groups
Görgün & Melekoğlu (2022)	Reading Fluency and Comprehension Supplemental Education Program (OKA2DEP)	A program that includes key-word/mnemonic, repeated reading and story map strategies, and the word cards exercise; this program aims to improve students' fluency and comprehension skills.
Grünke et al. (2015)	Story mapping instruction	A visual strategy designed to promote comprehension of the main parts of a story

Grünke et al. (2024)	TWA strategy	A strategy that includes the following elements: Think before reading, While reading, and After reading; it enables students to improve their reading comprehension performance through identifying the main elements of the texts.
Hall-Mills & Marante (2025)	Explicit text structure instruction	An instructional practice that focuses on teaching students identify text's structures in order to identify main ideas and summarize the critical information, which ultimately enhances their comprehension performance.
Jozwik & Douglas (2017)	Technology-assisted instruction (TAI; mind-mapping applications, e-text, electronic sticky notes)	A technology-based tool that contains mind-mapping applications, e-texts, and electronic sticky notes, etc., which aims to develop students' literacy skills and reading performance
Jozwik et al. (2019)	Self-regulated strategy (TRACK)	TRACK is a self-regulated strategy that helps students with their reading-related tasks. TRACK stands for the following aspects: Think, React, Ask questions, Connect, and Keep track of thinking.
Kemp (2017)	RAP strategy	RAP includes the following steps: R: Read a Paragraph, A: Ask yourself what the main idea is, and P: Put the main idea into your own words. The goal of RAP is helping students with their reading comprehension -related tasks.
Khasawneh & Abu Al-Rub (2020)	Training program based on the visual words composition techniques	The program, based on the study's definition, is combination of instructional drills and strategies based on the employment of visual words formulation technologies, which consisted of linking the written word technique, linking the verbal word technique, word recognition strategy instruction, word squares technique instruction.
Landa & Barbetta (2017)	Repeated reading	A strategy that targets reading fluency by having the reader repeatedly read a short passage for multiple times.
Okur & Aksoy (2025)	Verbal working memory instruction	A cognitive system responsible for the temporary storage and processing of information during complex cognitive tasks such as reading
Özbek & Ergül (2022)	Comprehension Strategies Mobile App (COSMA)	An app that includes comprehension strategies, including activating background knowledge, prediction, paragraph shrinking, comprehension monitoring, and self-instruction strategies
Sulaimon & Schaefer (2023)	Text-to-speech	A type of assistive technology that reads texts aloud.
Yılmaz & Melekoğlu (2024)	Repeated Reading and Visual Comprehension Program (TOGAP)	TOGAP is a program that includes many strategies that guides teachers to teach students reading-based tasks in order to enhance their reading comprehension performance.

Baseline/control group instruction

Of the 16 studies included in this systematic review, the majority of them (n= 7) used traditional reading comprehension instruction for baseline/control group instruction, while five studies utilized traditional reading instruction; the remaining studies used one-on-one and group instruction of weekly special education program, various instruction (e.g., introduction to day activities, audio check quality, and developing rapport), and finally one study administrated small group instruction (reading, predictions about texts, discussion, feedback, completing GOs of main ideas). Group design studies utilized one-on-one and group instruction of weekly special education program, traditional reading instruction, and traditional reading comprehension instruction, while one study (Khasawneh & Abu Al-Rub, 2020) did not report any information related to instruction of the control group. For single-subject design studies, six of them utilized traditional reading comprehension instruction, four used traditional

reading instruction, while the rest used small group instruction (reading, predictions about texts, discussion, feedback, completing GOs of main ideas) and various instruction (e.g., introduction to day activities, audio check quality, and developing rapport).

Outcome measures

Across the studies included in this systematic review, the majority of studies (n= 9) used researcher-developed comprehension assessment (RDCA) followed by non-standardized reading comprehension assessment (NSRCA; n= 3). The remaining studies (n= 4) utilized Index of Narrative Complexity (INC), a non-formal reading inventory, Gates-MacGinitie Reading Test, and Oral Reading Skills and Comprehension Test-II (SOBATV®-II).

Studies' findings

Overall, all studies included in this systematic review had promising, significant, and positive results, meaning all the aforementioned interventions have had significant effects on reading comprehension performance of elementary students with LD. In regard to group design studies (n= 4), their interventions have reveled significantly positive effects on treatment groups with LD compared to control groups with LD when it comes to comprehension performance. For single-subject design studies (n= 12), the interventions have also positively enhanced elementary school students with LD's reading comprehension performance. Overall, students performed significantly better in intervention phases than baseline phases. In regard to follow up/maintenance, ten studies (62.5%) did not report the follow up/maintenance of the interventions. None of the group design studies reported the follow-up results of the interventions, while six single-subject design studies did not report the outcomes of the maintenance phase. Across the 10 studies reported the maintenance results, students' overall reading comprehension performance continued to improve following the intervention, except two studies (Jozwik et al., 2019; Özbek & Ergül, 2022) where students' reading comprehension performance dropped during the maintenance phase.

Table 3. Results of interventions studies

Study	Intervention	Baseline/ control group instruction	Measures	Findings	Maintenance
Alqahtani (2021)	Reread-Adapt and Answer-Comprehend (RAAC) iPad (text-to-speech)	TRI	Index of Narrative Complexity	Positive results: improved RC performance S1—B: (M= 58.43, SD= 5.09) S2—B: (M= 36.46, SD= 10.33) S3—B: (M= 54.73, SD= 13.83) S1—I: (M= 84.95, SD= 9.16) S2—I: (M= 70.52, SD= 14.11) S3—I: (M= 80.31, SD= 5.45)	S1: (M= 86.97, SD= 4.27) S2: (M= 87.36, SD= 1.89) S3: (M= 80.45, SD= 6.41)
Atmaca & Yıldız-Demirtaş (2023)	Cognitive enhancement training (COGENT) program	One-on-one and group instruction of weekly SPED program	Non-formal reading inventory	TG outperformed the CG in RC (g = 1.09)	NR
Boardman et al. (2016)	CSR	TRI	Gates-MacGini-tie Reading Test	Students with LD in the CSR group made significant gains in RC than the ones with LD in the CG (g = 0.52.)	NR
Görgün & Melekoğlu (2022)	Reading Fluency and Comprehension Supplemental Education	TRI (RT&AQ)	RDCA	Positive results: improved RC performance S1, S2, S3: (Tau-U= 1.0) S4: (Tau-U= 0.97) S4: (Tau-U= 0.96)	NR

Study	Intervention	Baseline/ control group instruction	Measures	Findings	Maintenance
	Program (OKA2DEP)				
Grünke et al. (2015)	Story mapping instruction	TRI (RT&AQ)	RDCA	S1—B: (M= 3.5); I (M= 8.4) S2—B: (M= 4.5); I (M= 7.55) S3—B: (M= 6); I (M= 9.25) S4—B: (M= 9); I (M= 10) S5—B: (M= 10); I (M= 9.67)	Overall average scores ranged from 8.33 to 9.67
Grünke et al. (2024)	TWA strategy	TRI (RT&AQ)	NSRCT	Positive results: improved RC performance S1: (Tau-U= 0.83) S2: (Tau-U= 0.64) S3: (Tau-U= 0.83)	NR
Hall-Mills & Marante (2025)	Explicit text structure instruction (TEXT-MAPS)	Introduction to day activities Audio quality check develop rapport (discussion of participants' topics of interest)	RDCA	Positive results: improved RC performance Compare-contrast condition S1: (PND= 100%; Tau-U= 1.0) S2: (PND= 100%; Tau-U= 1.0) S3: (PND= 75%; Tau-U= .88) S4: (PND= 75%; Tau-U= .62) Cause-effect condition S1: (PND= 100%; Tau-U= 1.0) S2: (PND= 75%; Tau-U= .66) S3: (PND= 75%; Tau-U= .88) S4: (PND= 75%; Tau-U= .72)	Compare-contrast condition S1: (M= 40.5%) S2: (M= 39%) S3: (M= 23%) S4: (M= 42%) Cause-effect condition S1: (M= 50%) S2: (M= 50%) S3: (M= 22%) S4: (M= 28.5%)
Jozwik & Douglas (2017)	TAI (mind-mapping applications, e-text, electronic sticky notes)	TRCI (RT&AQ)	RDCA	Positive results: improved RC performance Literal Comprehension S1—B: (M= 50%); I (M= 85%) S2—B: (M= 67%); I (M= 88%) S3—B: (M= 53%); I (M= 86%) S4—B: (M= 39%); I (M= 76%) Inferential Comprehension S1—B: (M= 50%); I (M= 90%) S2—B: (M= 67%); I (M= 98%) S3—B: (M= 35%); I (M= 96%) S4—B: (M= 40%); I (M= 80%)	NR
Jozwik et al. (2019)	Self-regulated strategy (TRACK)	SGI (reading, predictions about texts, discussion, feedback, completing GOs of main ideas)	RDCA	Positive results: improved RC performance S1—B: (ME= NR); I (ME= 75%) S2—B: (R= 30-50%); I (ME= 80%) S3—B: (R= 10-20%); I (ME= 80%) S4—B: (ME= 50); I (ME= 85%)	S1: (R= 60-100%) S2: (R= 60-100%) S3: (R= 70-90%) S4: (M= 70-90%)
Kemp (2017)	RAP strategy	TRCI (RT&AQ)	NSRCA	Positive results: improved RC performance Literal Comprehension S1—B: (M= 64%); I (M= 65%; PND= 75%) S2—B: (M= 63%); I (M= 85%; PND= 100%)	Literal Comprehension S1: (M= 83%; PND= 85.7%) S2: (M= 88%; PND= 100%)

Study	Intervention	Baseline/ control group instruction	Measures	Findings	Maintenance
				S3—B: (M= 83%); I (M= 90%; PND= 100%) Inferential Comprehension S1—B: (M= 52%); I (M= 70%; PND= 25%) S2—B: (M= 40%); I (M= 70%; PND= 100%) S3—B: (M= 50%); I (M= 75%; PND= 100%)	S3: (M= 80%; PND= 100%) Inferential Comprehension S1: (M= 63%; PND= 100%) S2: (M= 72%; PND= 80%) S3: (M= 75%; PND= 100%)
Khasawneh & Abu Al-Rub (2020)	Training program based on the visual words composition techniques	NR	RDCA	TG outperformed the CG in RC (F = 192.703, p = 0.00)	NR
Landa & Barbetta (2017)	Repeated reading	TRCI (RT&AQ)	RDCA	Positive results: improved literal RC performance S1—B: (M= 2.25); I (M= 3.63) S2—B: (M= 2.25); I (M= 4.0) S3—B: (M= 3.11); I (M= 4.44) S4—B: (M= 3.30); I (M= 3.71)	NR
Okur & Aksoy (2025)	Verbal working memory instruction	TRCI (RT&AQ)	NSRCA (SLD-COB)	TG outperformed the CG in RC (p = 0.04, d = 0.92).	NR
Özbek & Ergül (2022)	Comprehension Strategies Mobile App (COSMA)	TRCI (RT&AQ)	RDCA	Positive results: improved RC performance RC test S1—B: (M= 3.8); I (M= 7.4; PND= 100%) S2—B: (M= 3.33); I (M= 7.3; PND= 100%) S3—B: (M= 3); I (M= 6.5; PND= 100%) S4—B: (M= 8); I (M= 10; PND= 100%) Retelling S1—B: (M= 5.40); I (M= 9.7; PND= 100%) S2—B: (M= 5.66); I (M= 9.8; PND= 100%) S3—B: (M= 4.85); I (M= 7.2; PND= 100%) S4—B: (M= 5.12); I (M= 10.5; PND= 100%)	RC test S1: (M= 6.66) S2: (M= 7.66) S3: (M= 7) S4: (M= 3) Retelling S1: (M= 8.33) S2: (M= 8.33) S3: (M= 7.33) S4: (M= 8.66)
Sulaimon & Schaefer (2023)	Text-to-speech	TRCI (RT&AQ)	RDCA	Positive results: improved RC performance S1—B: (M= 42%); I (M= 73%) S2—B: (M= 40%); I (M= 73%)	NR

Study	Intervention	Baseline/ control group instruction	Measures	Findings	Maintenance
Yılmaz & Melekoğlu (2024)	Repeated Reading and Visual Comprehension Program (TOGAP)	TRCI (RT&AQ)	Oral Reading Skills and Comprehension Test-II (SOBATV®-II)	Positive results: improved RC performance S1—B: (M= 4.33); I (M= 7.75; Tau-U= 72%) S2—B: (M= 6.33); I (M= 9.50; Tau-U= 92%) S3—B: (M= 5.66); I (M= 7.75; Tau-U= 31%) S4—B: (M= 5.66); I (M= 9; Tau-U= 95%)	NR

Note. CG= Control Group; CSR= Collaborative Strategic Reading; GO= Graphic Organizers; LD= Learning Disabilities; M= Mean; ME= Median; NSRCA= Non-standardized Reading Comprehension Assessment; PND= Percentage of Non-overlapping Data; R= Range; RAP= Read, Ask, Put; RC= Reading Comprehension; RDCA= Researcher-developed Comprehension Assessment; RT&AQ= Reading Texts and Answering Questions; S= Student; SGI= Small Group Instruction; SLD-COB= Specific Learning Disabilities-Clinical Observation Battery; SPED= Special Education; TAI= Technology-Assisted Instruction; TG= Treatment Group; TRACK= Think, React, Ask questions, Connect, Keep track of thinking; TRI= Traditional Reading Instruction; TRCI= Traditional Reading Comprehension Instruction; TWA= Think before reading, While reading, and after reading.

Discussion

The purpose of this systematic review was to synthesize and evaluate studies conducted between 2015 and 2025 to examine the effects of various interventions on reading comprehension performance of elementary school students with LD. This review was mainly conducted to update the field of the most recent practices that can enhance reading comprehension outcomes of elementary students with LD. Overall, studies have revealed significantly positive to promising effects on comprehension performance. The overall outcomes of this systematic review are similar to previous syntheses, literature reviews, and meta-analyses (e.g., Berkeley & Larsen, 2018; Ciullo et al., 2016; Hall-Mills and Marante, 2022; Kim et al., 2017; Scammacca et al., 2015; Stevens et al., 2017; Wood et al., 2018).

Limitations

Although this systematic review revealed that the identified interventions have positive effects on reading comprehension performance of elementary students with LD, several limitations should be posed and acknowledged. First, there is still an ambiguity related to the search terms used across empirical studies, syntheses, literature reviews, and meta-analyses, especially when it comes to defining students with LD. In other words, having no consensus across the literature related to students with LD and reading comprehension causes a confusion to researchers trying to synthesize the literature aiming to identify evidence-based practices for students with LD. Having ambiguous definitions of participants with LD resulted in excluding some of the studies.

Second, it is understandable and given that every study has its own limitations; at the end of the day, researchers cannot control the studies-related circumstances, which was taken into consideration while applying the inclusion/exclusion criteria. However, due to the extreme poor quality of some studies' methodologies, there were excluded. This ultimately resulted in the limited number of studies included in this systematic review. Third, only peer-reviewed studies were included in this systematic review, meaning dissertations and conference papers, for example, were excluded, which limited the number of studies included in this review. Regardless of the aforementioned limitations, this systematic still offers valuable information and practices that can enhance comprehension performance of elementary students with LD.

Implications and future direction

Based on the findings of this systematic review, several recommendations and future direction

should be posed and addressed. First, although students with LD are mainly included in inclusive settings, only four of the 16 studies included in this review were conducted in such settings, while the rest were conducted in other settings (e.g. resource rooms). Therefore, future researchers are recommended to consider conducting their studies in inclusive classrooms since students with LD spend the majority of school day in these settings. Second, having the fact that most studies (n= 11; 68.75%) were administrated by researchers is questionable since students realistically spend most of their school day with their teachers. In order to sustain the effect interventions, future studies may consider training teachers on utilizing interventions and practices prior to conducting the study; researchers and teachers may look at this opportunity differently or like a win-win situation, meaning researchers help students with their reading comprehension-related tasks while providing teachers with professional development opportunities. This ultimately may have long-lasting impact on students with LD's reading comprehension performance.

Third, across the 16 studies included in this systematic review, five did not report the fidelity of implementation, which is roughly third of the studies (31.25%). As known, administrating the treatment fidelity ensures that the intervention was implemented as planned, which is critical for the quality of the studies conducted. Therefore, future research may focus not only on treatment fidelity but also on all of its aspects (adherence and assessment, dosage and exposure, timing). Fourth, ten studies reported the social validity through interviewing or surveying the study's participants, asking them mostly about their perceptions of the interventions and their effectiveness; however, six studies (37.5) did not. Future studies, hence, may consider report the social validity of studies in order to gauge the participants opinions and perspectives of the interventions. Having such practice and considering the participants' input and perceptions may help researchers with adjusting their future studies, especially when it comes to designing their interventions. Fifth, nine studies (56.25%) use researcher-developed comprehension assessment (RDCA), which is not surprising since the limited availability of reading-based standardized assessments, which makes it challenging for researchers to use such assessments. Future studies may consider using reading-based standardized assessments in order to accurately measure students' reading comprehension performance.

Finally, the quality of some studies conducted to support students with LD with reading comprehension performance is still questionable. It is totally understandable that researchers cannot control all the circumstances while conducting studies, such students' attrition, schools' scheduling issues, etc. However, the "extreme" low quality of some studies can result in excluding them from syntheses, literature review, and meta-analyses. Seventh, the number of replication studies is still limited, which affects the evidence-based practices indirectly. Taken together, having low quality studies and the limited number of replications can have direct or indirect impact on building the evidence-base of practices that may enhance students with LD's reading performance. Therefore, future researchers are recommended to adhere to the Council of Exceptional Children (CEC) or What Works Clearinghouse (WCC) standards while conducting their studies, which can contribute to building the evidence-base of reading comprehension-related practices for students with LD.

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