READING INTERVENTION: IMPROVING LOW READING COMPREHENSION IN ELEMENTARY

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Abstract

Having strong reading comprehension skills is a significant factor in a child's academic success, particularly as it relates to upper elementary. It is crucial to address low reading comprehension in the 4th grade before children are required to read more complex text structures as previous studies have demonstrated that reading problems will only persist. The aim of this literature review is to investigate the efficacy of vocabulary and reading comprehension interventions for students (grades 3-6) that have been identified as having a low reading comprehension. Multicomponent interventions with decoding, fluency, vocabulary, and comprehension were included if they included reading comprehension as an outcome measure. Six studies published between 2000 and 2020 were included based on the pre-established criteria. All of the studies identified were experimental studies. Overall, results indicated moderate effect sizes regarding reading comprehension. There are mixed outcomes relative to the measure used and some studies had statistically significant effect sizes and others did not.

Keywords: reading intervention, low reading comprehension, reading difficulties, elementary school

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Reading is an essential skill for elementary kids in grades 1-5 because reading complexity becomes prevalent in upper grades. Reading comprehension enables students to understand complex subjects in later grades, but it remains a challenge for many students that move from early elementary to upper elementary grades. As of 2019, the National Assessment of Educational Progress, 65% of fourth graders scored below proficient in reading and minority groups consistently score lower (The Nation's Report Card, n.d.). The expectations for fourth and fifth graders reading comprehension aptitude remains high as they are expected to be able to read and comprehend a range of texts, including informational texts across content areas independently and proficiently (Ritchey et al., 2017). Improving reading comprehension remains the most challenging area of reading to improve through intervention; however, if this is not addressed, it may lead students with low reading comprehension towards further decline with the reading comprehension ability.

There have been national initiatives such as Reading First and Title I that were designed to prevent reading difficulties before fourth-grade; however, remediation of reading difficulties remains abundantly necessary in fourth-grade and beyond (Kim et al., 2009). The view that fourth grade is an important time for students to read to comprehend, influenced the focus of this literature review to be primarily focused on upper elementary (grades 3-6) reading comprehension because in the fourth grade, students must rely on knowledge of words and ideas that go beyond many students' everyday experiences. This means that passage complexity is prevalent in day-to-day learning that may influence the student's level of reading comprehension. As students' move into the upper elementary grades, it is possible that they may get left behind because the expectation is for them to be at par with their grade level reading and comprehension.

Research on reading comprehension

Specifically, previous studies investigating reading comprehension interventions that have focused on self-regulation and self-questioning, have been linked to moderate to large gains in comprehension (Ritchey et al., 2017). Similarly, interventions that include opportunities for peer mediated practice using appropriate texts, reciprocal teaching, and collaborative strategic reading, have resulted in gains in reading comprehension, most noticeably in older students. There has also been much debate over which treatment is better in addressing low reading comprehension. Previous studies have concerns over which treatments to implement such as repeated reading versus reciprocal reading (Oostdam et al., 2015). The National Reading Panel has reported that phonemic awareness, phonics, fluency, vocabulary, and comprehension are five key components of scientifically-based reading instruction (National Reading Panel, 2000). The focus of this literature review was to locate experimental studies designed to answer causal questions as a source of high quality information to inform educational practice.

Reading comprehension requires students to read, interact with text, and extract meaning from passages, but when students fail to do so, there are reading intervention methods that can improve reading comprehension (Solis et al, 2017). Explicit instruction and cognitive strategy instruction in reading comprehension are essential to helping students understand the context of passage that allows them to draw conclusions or meaning from it. Students with low reading comprehension need intensive interventions before students move on to upper grades because they are less likely to receive interventions during the upper grades (Vaughn et al., 2000). Addressing low reading comprehension in early elementary grades is crucial to a student's reading stages because not all students show typical learning trajectories, and some may need

additional sessions than others. The purpose of this literature review is to answer the following question: How effective are reading comprehension interventions in improving reading comprehension in upper elementary for students with reading difficulties?

Method

Procedure and Search Criteria

A comprehensive search of intervention studies was conducted on the ERIC, JSTOR and APA PsychNet databases to locate studies published in peer-reviewed journals between 2000-2020. The search terms used for the database search included: reading intervention, low reading comprehension, reading difficulties, vocabulary and elementary school. Journal abstracts were primarily used to determine if they met the criteria established. Majority of the journals that were included were published in *Psycho-Educational Research Reviews*, *Journal of Learning Disabilities*, *Exceptional Children* and *Research Papers in Education*. I prioritized studies that demonstrated high internal validity but moderate external validity, this means that the study could be slightly generalized to a broad context, but high internal validity means there is a strong enough relationship between the treatment and result of a treatment. A total of 7 studies were selected for this literature review. These studies are not all inclusive of all the studies in this body of literature. They were included based on the following criteria:

1. Participating students must be in grades 3 through 6 (ages 9 - 12). Students who were older because of failing a class were not excluded.
2. Participants were identified with low reading comprehension through evidence from pretest assessment data. Studies were included if all participants had low reading comprehension scores or considered to have reading disability. If the subject of learning disabilities was included, the study was not excluded. All students identified to have low reading comprehension were

included regardless of the language they used; however, the reading interventions were all in English, and the materials provided were in English. Studies that included English language learners, ADHD, and students considered to be on the autism spectrum were included.

3. Studies that primarily targeted reading comprehension as the treatment were included, but studies that included additional components of reading such as word recognition, fluency and vocabulary were also included.

4. Studies had to show evidence of a control or comparison group within the design to be included. The experiment had to have an experimental or quasi-experimental.

5. Studies that did not include treatment fidelity were not disqualified from this literature review, but it was an important component that was prioritized.

Effect Size Calculations

Hedge's g was used to calculate effect sizes because it is less prone to error than other effect size calculations with small sample sizes (Solis et al., 2017). The effect sizes for treatment-comparison studies were calculated based on the given means, standard deviation, and sample size. The effect size for each posttest in the experimental study was calculated, but the pretest was not calculated since the focus of the review is primarily interested in the posttest outcome performance. Six of the studies used BAU for their control group, and one used a district after school program that did implement reading instruction as its comparison group. The outcomes for the different conditions in the studies were used to calculate effect sizes for reading comprehensions.

Results

Study Features

A total of 7 studies were selected: 7 experimental studies chosen reviewed the impact of reading interventions on reading comprehension in upper elementary. A total of 871 students were represented between all the studies. The number of treatment sessions ranged from 10 to 92 sessions. Five of the studies reported an average session duration of 30 minutes. All of the studies reported the methods used to screen participants and the total number of participants included in the study. Students chosen for the study were either identified by their teachers as low comprehension readers or scored poorly on reading assessments. Six of the studies reported fidelities of treatment, which measures the reliability of an administered intervention. Fidelity is an important aspect of any experiment or study because it demonstrates that there is validity within the research study.

A total of 4 studies reported information about the specific reading material used and the other 2 were lacking specific description being referred to as "classroom content" for the reading materials. The type of materials used were described as the following: Informational text (n=1), Science and social studies texts (n=4), non-fiction (n=1) and current classroom content (n=1) The reading by Kim et al. (2009), was the only study that specified materials used for a comparison group since students in this group were in an after school reading program that included optional small-group teacher lessons using 16 different activities. The activities included the following: history, geography, space exploration, KidzMath and KidzLiz-120. The studies differentiated between interventions that were implemented by the researcher (n=4) and others by school personnel (n=3). All 7 of the studies described how they identified students to participate in their study. Identifying students ranged from teachers identifying students with potential reading difficulties, and screening students with reading tests. The measures were either

implemented by researchers or school personnel. Table 1 displays the Summary of Study Characteristics for each study.

Table 1. Summary of Study Characteristics

Study	Study Design	Participants	Grade	Duration	Reading Material	Person Implementing
Ritchey et al., (2017)	Experimental Random Assignment	N= 46	5th	40 sessions	Informational science texts	Researcher
Vaughn et al., (2000)	Experimental Random Assignment	N= 280	4th-5th	68 sessions	Science and social studies texts	Researcher
Solis et al., (2017)	Experimental Random Assignment	N= 44	4th	10 sessions	Colonial America Social Studies texts	School Personnel
Oostdam et al., (2014)	Experimental Random Assignment	N= 126	2nd-4th	48 sessions	Non-fiction children's books	School Personnel
Gomma and Ooma., (2015)	Experimental Random Assignment	N= 66	5th	3 sessions/ week	Current classroom content	Researcher
Stevens et al., (2020)	Experimental Random Assignment	N= 61	4th-5th	25 sessions	Social Studies and Science Context	Researcher
Kim et al., (2009)	Experimental Random Assignment	N=294	4th-6th	92 sessions	Read 180 science/math history, geography	School Personnel

Treatment conditions included strategy instruction, questioning, vocabulary, reciting, and repeating. The interventions were either researcher implemented (n=4) or administered by school personnel (n=2). The measures this literature review was concerned with, were only the

ones that were reading comprehension focused. Studies did include measures relating to vocabulary, and reading fluency because these reading skills are needed to build reading comprehension abilities. For example, understanding vocabulary is needed to understand the meaning of text to comprehend the content and purpose of text. There were (N=2) studies that used the *Test of Silent Reading Efficiency and Comprehension (*Wagner, R. K., Torgesen, J., Rashotte, C. A., & Pearson, N.(2010). *Test of Silent Reading Efficiency and Comprehension. Austin, TX: Pro-ED.*, (N=2) used the *Gates MacGinitie Reading Test MacGinitie (*MacGinitie, Maria, Dreyer, & Hughes, 2000*),* (N=1) used a researcher developed reading comprehension test, (N=1) used the GMRT-RC; (MacGinitie, MacGinitie, Maria, Dreyer, & Hughes, 2000), (N=1) B*egrijpend Lezen Test* and (N=1) used the *Woodcock-Johnson III Passage Comprehension (*Woodcock et al., 2001*).* Summaries of the study measures and outcomes are presented in Table 2.

Description of Instruction

There were (n=2) studies that included multiple phases of the intervention. For example, the study by Vaughn et al. (2000), had multiple phases because the first part of the instruction was focused on key words representing the text's main idea; repeated reading of the text in different formats with a specific fluency goal to improve students' rate, accuracy, or expression; and the use of key words to summarize the passage (Vaughn et al., 2000). The 2nd and 3rd phases were comprehension focused as it included reading the passage, answering comprehension questions, and evaluating reading goals. These are different phases of the intervention as they have different goals. Only one study included a comparison group that was not business as usual because it placed the comparison group in an after school program where they did receive additional instruction. The measures were either researcher developed (N=4) or

standardized tests (N=3). Student performance differentiated across studies based on the type of measure that was implemented. A summary of measures and outcomes can be seen in table 2.

Ritchey et al. (2017), included 46 fifth-grade students with poor reading comprehension, (n=23) per condition. After the TOSREC test was administered, students were selected for treatment or BAU. There were seven small groups of two or four students that met for forty 30-min sessions, 4 times a week over a 10-12 week period. Intervention components included informational text related to life around the ocean. Comprehension instruction included the following: previewing texts, activating background knowledge, using strategies to decode and understand unfamiliar words, identify the main idea by "shrinking" the paragraph, summarizing, and using an adaptation of the QAR strategy (Ritchey et al., 2017). The results indicated moderate to significant effect sizes favoring the treatment over the comparison condition.

Vaughn et al. (2000), included a total of 280 students, (n=139) treatment and (n=141) BAU. The instruction was held for 30-45 minutes and exposed students to expository and narrative texts in groups of three or six. The intervention had multiple phases, the first one included an introduction of key words representing the text's main idea; repeated reading of the text in different formats with a specific fluency goal to improve students' rate, accuracy, or expression; and the use of key words to summarize the passage (Vaughn et al., 2000). The 2nd and 3rd phases included: setting goals, reading the passage, answering comprehension questions, and evaluating reading goals. Overall, the effect size was not statistically significant (Vaughn et al., 2000).

Solis et al. (2017), included 44 students in the study, (n=23) and (n=19). The intervention condition included ten instructional groups (5 each tutor) of two-three students who received the intervention instead of the comparison condition. Students in the intervention condition received

eight, 30 min sessions over a two-week period. Each instructional session was organized around the following: introduction of self-monitoring, vocabulary instruction, text-based reading, and conclusion of self-monitoring. The instruction included self-monitoring checklist list that included a goal of how many vocabulary words would be learned in the lesson and a pre and post self-assessment of attribution statements: (a) *"Believe,"* (b) "*Evaluate: What do I need to do,"* (c) *"Stay with it,"* and (d) "*Think: What can get in the way (*Solis et al., 2017*)*. The text-based approach to reading instruction encouraged students to find and support answers from content of the text. This was accomplished by referring students back to the text to reread to answer summarization questions and answer what the text was about (Solis et al., 2017). The reading comprehension measure, The *Gates MacGinitie Reading Test* served as the screening measure, and the curriculum researcher-developed measure indicated that students in the treatment condition made statistically significant gains on comprehension compared with students in the BAU condition.

Oostdam et al. (2015), assessed the efficacy of guided oral reading as a remedy for low-achieving readers. Two experiments were conducted in the early grades of primary school. In the first, students were randomly divided between two treatment groups and a control group. In treatment groups, the intervention was delivered one-to-one, either in a repeated reading (RR) or in a continuous reading format, depending on how often students practiced with the same text. In the second experiment, poor-reading students were randomly divided between a group- based guided oral reading condition and a control condition. The reading comprehension measure in this study was the Begrijpend Lezen test, a standardized measure. A typical test booklet contains

between five and ten passages and 25 multiple choice questions. The results did not indicate that the individual and group variants of guided oral reading are effective on reading comprehension.

Gomma and Omema. (2015), investigated the effect of using reciprocal teaching intervention strategy on improving reading comprehension of reading disabled students in 5th grade. Reciprocal reading is a form reading instruction where the teacher and student create dialogue through prediction, questioning, summarizing, and clarification in the instruction. A total of 66 students identified with reading difficulties participated. This was the only study to include all boys in the experimental (N=33) and control groups (N=33). Students received instruction 3 times a week, 40 and 45 minute sessions. The students were placed in groups of five and assigned with one of the following roles: summarizer, inquirer, clarifier, and predictor. The group discussion was facilitated by the teacher. Findings from this study indicated the effectiveness of reciprocal teaching intervention strategy on improving reading comprehension in the target students. On the basis of the findings, the study advocated for the effectiveness of reciprocal teaching intervention strategy on improving reading comprehension in reading disabled students.

Stevens et al. (2020), had 62 students randomly assigned to receive tier 2-type intervention or business-as-usual instruction. The intervention was given to student groups of 4-6, two or three times per week. There were 25, 40 minute lessons that were focused on paraphrasing sections of the text by identifying the main topic and the most important idea about the topic. The materials used were social studies and science related. Students in the comparison group continued their BAU condition, which included science and social studies. The study used

the Structure Identification and Main Idea Generation Test (SIMIG), which is a researcher developed measure of students' skill in text structure and main idea generation adapted from an assessment used in related intervention research. The results of this test indicated that students in the treatment condition significantly outperformed students in the comparison condition on main idea generation and text structure. Strategy Use Measure (SUM) is also a researcher developed measure where students read three leveled passages and then answer open-ended questions that assess their knowledge and use of two specific comprehension strategies: question-generation and main idea generation. In Part 2, students read the same passages and select the best possible main idea statement from four choices. The findings from the SUM suggest that reading intervention may improve students' reading comprehension as the effect size was statistically moderate. The Gates-Macginitie Reading Test 4th edition (GMRT-RC) measure did not have a statistically significant result, which the authors attributed to it not being a broad measure of other related constructs (e.g., word and world knowledge) and not a particularly well-suited measure of students' main idea generation and integration. The effect sizes of these measures can be seen in table 2.

Kim et al. (2009), examined the causal effects of READ 180 by conducting a mixed-methods literacy intervention on measures of word reading efficiency, reading comprehension, vocabulary, and oral reading fluency. She also examined whether print exposure among children in the experiment condition explained the variance in posttest reading scores. There were a total of 294 students in grade 4-6 that were randomly assigned to READ 180 or a district after school program. The READ 180 intervention included individualized

computer-assisted reading that had videos, leveled text, and word study activities. The intervention also included independent and modeled reading practice with leveled books, and teacher directed reading lessons tailored to the reading level of children in small groups. The district after school program had children participate in 60 minutes of any 16 different enrichment activities that a teacher could choose from to improve attendance. Results indicated there was no significant difference between children in READ 180 and the district after school program on word reading efficiency, reading comprehension, and vocabulary.

Table 2. Summary of Measures and Outcomes

Intervention	Measures	Findings
Ritchey et al., (2017 Treatment previewing texts, activating background knowledge, using strategies to decode and understand unfamiliar words, identify the main idea by "shrinking" the paragraph, summarizing Control BAU	QRI TOSREC *ASKIT* *WIAT*	Assessment of Knowledge and Strategy T vs. C, ES= 0.819 QRI Comprehension= 0.654 TOSREC T vs. C, ES= 0.154 WIAT T vs. C, ES= 0.257
Vaughn et al., (2000) Treatment Repeated reading summarization Control BAU	*Gates-MacGinitie Reading Test* WJ-III Passage Comprehension	Gates MacGinitie T1 vs. C, ES= .111 WJ-III= -0.091
Solis et al., (2017) Treatment vocabulary instruction, text-based reading, self-monitoring. Control BAU	The *Gates MacGinitie Reading Test*	Gate MacGinitie Reading test T vs. C, ES = .893
Oostdam et al., (2014) Treatment Repeated reading Control BAU	Begrijpend Lezen Test	Reading Comprehension T vs. C, ES= 0.106
Gomma and Omemal., (2015) Treatment Reciprocal teaching Control BAU	Reading Comprehension Test	Reading Comprehension T vs. C, ES = 0.106

Stevens et al., 2020 Treatment Paraphrasing Control BAU	Gates-Macginitie Reading Test 4th edition GMRT-RC SMIG SUM	GMRT-RC T vs C, ES= -0.19 SMIG Structure Identification T vs C, ES= 0.783 SMIG Main idea Generation T vs C, ES= 0.699 SUM Question and Main Idea Generation T vs C, ES= 0.368 SUM Main Idea Identification T vs C, ES= 0.394
Kim et al., (2009) Treatment Computer assisted reading Reading leveled books Teacher directed reading Control District after school program	GRADE Attendance	GRADE T vs C, ES= 0.022 Attendance T vs C. ES= 0.308

Notes:Tosrec= Test of Sentence Reading Efficiency and Comprehension; WIAT= Wechsler Individual Achievement Test; WJ-III= *Woodcock-Johnson III Passage Comprehension; ASKIT= Assessment of Strategy Knowledge and Use for Information Text; RC= Reading Comprehension; RA= Reading Attitude; BAU= Business as Usual,* QRI = Qualitative Reading Inventory; WRMT-R = Woodcock Reading Mastery Tests-Revised; SMIG= Structure Identification and Main Idea Generation; SUM= Strategy Use Measure; GRADE= Group Reading Assessment and Diagnostic Evaluation.

Fidelity Report

All the studies, except Gooma and Omema. (2015) included treatment fidelity. Ritchey et al. (2017), audio recorded instruction, but also created a rubric to evaluate fidelity of intervention implementation focusing on following lesson plan structures, lesson duration, and quality of instruction. Vaughn et al. (2000), audio recorded all lessons, and the research assistants coded the recordings to follow if all required components were implemented. Solis et al. (2017) had a second researcher observe tutors for 2 out of 8 sessions and completed a code sheet. Oostdam et al., 2015, was vague in explaining how it included treatment fidelity, but the authors explain that "Logs were also used to keep notes on the texts that were read and other relevant matters, such as any deviation from the protocol. All logs were collected afterwards and checked for treatment fidelity. The conclusion is that the treatment fidelity was generally high." Stevens et al., 2020 audio-recorded a total of 146 recordings, but the authors also used a fidelity protocol and code sheet. Kim et al., 2009, conducted observations of the READ 180 classrooms to assess fidelity of intervention.

Discussion

This literature view summarized findings from 7 studies utilizing treatment and comparison groups as a means of understanding the effectiveness of interventions aimed at improving reading comprehension of students identified as having low reading comprehension (grades 3-6). I selected these grades because students experience what is called the "4th grade slump" and it is difficult for them to progress if there isn't an intervention during upper elementary. The goal was to identify practices that had statistically significant impact on reading comprehension, so they may be adopted in the classroom. The findings from this literature review indicate an overall moderate effect size. Five studies reported researcher developed measures that yielded higher effect sizes compared to the two that reported standardized measures. Most of the studies were focused on implementing main idea-summarization strategies. These reading tasks are common in the classroom, which is why it is important to instruct students with them in interventions.

Low reading comprehension is clearly not easily resolved because students have different educational backgrounds and starting points with their literacy skills. Although reading interventions are implemented across districts, students tend to get left behind because they are not always significantly effective as the results here have shown. It is important to address that reading interventions do not keep every student from falling behind, but this literature review does highlight that there are considerable benefits from reading comprehension interventions in elementary grades. The studies did suggest that reading interventions do have a moderate increase in reading comprehension among students with low reading comprehension compared

to the BAU or specified comparison condition, which is why they are worth considering for use by schools.

Implications For Practice

This literature review has important implications to current literature and future research on examining how effective reading interventions are for students with low reading comprehension. One of the implications from this literature review is to provide educators working with students with low reading comprehension professional development to teach them the most impactful instruction to help improve reading comprehension. For example, Solis et al. (2017), was a successful intervention that should be recommended for low reading comprehension students since it did have a statistically significant effect size ($ES = 0.89$). Secondly, it reinforces research attempting to exemplify reading interventions as an effective method to improve low reading comprehension. Some methods in the studies from this literature review included summarization, identifying main idea, repeated reading, and reciprocal teaching.

Implications for Future Research

In 2021, California State Superintendent of Public Instruction, Tony Thurmond, announced a bold vision that seeks to have every 3rd grade read by 2026 (California Department of Education, 2021). His plan appears to be focused on community wide efforts towards literacy improvement such as campaigns to get children library cards and book drives. His plan does not address any specific instructional approaches to support the lowest performing students. This review of the literature revealed many instructional methods that have been highlighted in this

literature review. There is the following: summarization, main ideas, reciprocal teaching, making predictions and repeated reading. The goal should be to create an intervention method that works for students and teachers. In all future research, it is important to consider that students do improve reading comprehension and skills in early grades, but "children who fail to acquire basic word reading skills in the primary elementary grades (K-3) typically fall behind in reading during the late elementary grades (4-6) and undergo a marked deceleration in comprehension after fourth grade (Kim et al., 2010)." Most importantly, this literature review supports the need for reading interventions in upper elementary (grades 3-6).

Based on the information that students in 4-6 grade reading can decline without appropriate support in school, that new bold vision for the state of California should consider and include findings from experimental studies related to reading comprehension. Especially the applied studies that are focused on school implemented reading intervention programs in upper elementary. Future studies should consider other instructional components such as vocabulary, phonics, and word fluency in grades 4-6. Longitudinal studies designed to maintain the momentum of K-3 instruction into upper elementary would greatly contribute to our understanding.

Limitations

The studies selected for this literature make up a small sample size of studies to analyze the effect of reading comprehension interventions compared to other studies that address reading comprehension. This implicated the study because there was only a small number of measures and treatments that information could be drawn from. It also influenced the original focus of the

research, which was to study reading interventions that improved only 4th grade students' low reading comprehension. The criteria had to be expanded to incorporate other grades and treatments. Lastly, it is important to acknowledge that the studies in this literature review are not studies that have been conducted over a long duration of time. This limits the generalizability and limitation of finding effect sizes that may be more representative of low reading comprehension students.

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