KENTUCKY READING RESEARCH CENTER

A Review of Phonics Interventions or Practices for Children in Kindergarten Through Third Grade (2014-2024)

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Abstract

This review focused on phonics interventions or practices designed to help children in kindergarten through third grade learn to develop foundational reading skills related to phonics. The Institute of Education Sciences What Works Clearinghouse (WWC) issued an educator's practice guide, Foundational Skills to Support Reading for Understanding in Kindergarten Through 3rd Grade, that covered this topic in 2016. Our goal with this review was to update that practice guide with peer-reviewed research published between 2014 and 2024.

Introduction

In this review we align with Mesmer and Griffith (2005) who define phonics as both "a system for encoding speech sounds into written symbols [as well as a way of] teaching learners the relationships between letters and sounds and how to use this system to recognize words" (p. 366-367). Often positioned at the center of foundational reading instruction for students in the primary grades, phonics—including the skills students must acquire if they are to become proficient decoders as well as effective ways of teaching students these skills—has been the focus of a number of systematic reviews and meta-analyses. In this systematic review, we synthesize the experimental research conducted between 2014 and 2024 to understand how to support students in grades K-3 in developing the ability to read words fluently and proficiently.

What is Phonics?

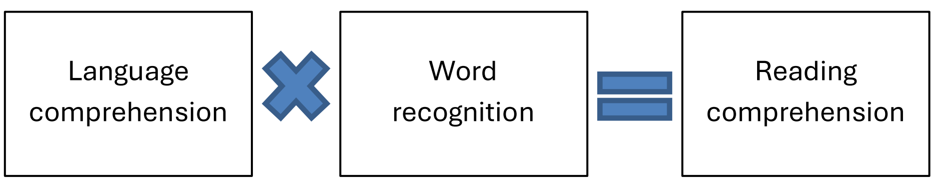
According to the Four-Part Processing Model (Seidenberg & McClelland, 1989), skilled reading requires the development and coordination of four regions—processors—in the brain. These processors make sense of phonological information from speech sounds, orthographic information that allows us to recognize written language and the sounds that correspond to visually-represented letters or morphemes, meaning or semantic processing helps us develop vocabulary and determine the meaning of words, and context, which permits an understanding of words in context, such as those contained in connected text (Adams, 2001). Phonics specifies both the skills needed to process orthographic information and the effective means of teaching students to do this work. To efficiently and accurately read words, both those presented in isolation and when contained within connected text, students must learn:

- The alphabetic principle or the understanding that written letter(s) that represent a spoken sound and that these sounds combine in often predictable patterns to form words;

- How to decode by segmenting a word into its composite letters and related sounds and how to blend those pieces together to read the word; and
- To automatically read irregular words that cannot be decoded, especially high-frequency words that students are likely to encounter in text (Honig et al., 2018).

To acquire these skills, students must be able to identify letters and should have begun to develop phonemic awareness. As more fully described in a separate report, phonemic awareness refers to students' ability to process phonological information by identifying and manipulating individual sounds (phonemes) within words. As students acquire phonemic awareness, they learn to segment a word into sounds and add, delete, or substitute sound(s) to produce a new word. Students who have developed an understanding of the alphabetic principle, or the idea that sounds are represented by letter(s), can then visually represent these sounds with printed letters through phonics instruction. Having fully developed phonemic awareness prior to engaging in phonics is not necessary, however, as phonics and phonemic awareness have a bootstrapping relationship where development in one skill area supports development of the other (Lane & Pullen, 2004).

Phonics plays a key role in developing students' reading proficiency. If students are to read increasingly complex texts with fluency and understanding, they must have developed ability to decode (Honig et al., 2018). In fact, according to the simple view of reading (Gough & Tunmer, 1986), word reading is one of only two components associated with reading comprehension.



As represented in this equation, students' ability to read words has a multiplicative relationship with language, meaning language is both important to accurate word reading but also that word reading can improve language (e.g., vocabulary, Perfetti & Hart, 2001; 2002). Without developed word reading ability, students will not be able to comprehend texts or access the knowledge contained within them. Deficits in reading comprehension compound over and beyond a students' school career and can reduce their educational and post-secondary opportunities (e.g., Lal, 2015).

For many students, learning how to accurately and efficiently process orthographic information to read words requires specialized instruction (Steubing et al., 2008). According to the consensus body of work accumulated within the US and internationally over the last 50 years—the science of reading—this instruction should be systematic and explicit (Honig et al., 2018; National Reading Panel, 2000). Systematic phonics instruction includes building students' understanding of the alphabetic principle by teaching phoneme-grapheme relationships in a logical sequence and with increasing complexity (Armbruster et al., 2001). Simple sounds with the highest utility should be taught first (e.g., /m/, /s/, /a/ are taught before /j/, /ā/) and complexity increases as students master novel sounds (Ehri, 2020). Under these conditions, student learning is facilitated, and mastery is more likely because "whenever children are asked to learn something new, they already possess the appropriate prior knowledge and understandings to see its value and to learn it efficiently" (Adams, 2001, p. 72).

This logical sequence of instruction is also a characteristic of explicit instruction. Explicit instruction is designed to maximize student learning and increase the likelihood of mastery by reducing the need for students to guess, independently discover, or infer. When instruction is explicit, it clearly presents novel information and supports students as they gain facility and independence with new understandings (Carnine et al., 2006). Key characteristics of explicit instruction include: (1) chunking information into manageable parts; (2) clearly stated instructional goals; (3) teacher modeling and a gradual release of responsibility for using a novel skill by engaging students in increasingly independent practice; and (4) clear and timely feedback to ensure student accuracy when practicing (Archer & Hughes, 2011).

Factors Affecting Phonics

Many meta-analyses, systematic reviews, literature syntheses, and consensus reports (e.g., practice guides) of phonics have been conducted. These reviews help to define phonics as both a skill set for students to develop orthographic processing and a method for teaching these skills, including explicating for whom and under what conditions these instructional practices are effective. Evidence from these reports suggests instruction should target several skills to build students' orthographic processing capacity. First, because students' alphabetic knowledge facilitates their decoding novel words and building their sight word vocabularies (Ehri, 2005), students should learn how to rapidly and automatically identify letters. Second, to build students' understanding of grapheme-phoneme correspondences, they should be systematically taught common sound-spelling patterns including CVC words, onset and rimes, di- and trigraphs, silent letters, vowel teams, diphthongs, r-controlled vowels in single syllable words. They should also learn the six different types of syllables and should be able to read high frequency words automatically and accurately (Foorman et al., 2016). Students' automaticity with letter and sound identification is also associated with their letter writing fluency (Ray et al., 2022) suggesting student writing is also an important part of developing their orthographic processing. Finally, while learning how to decode words in isolation is vital, students should also have opportunities to apply developing knowledge when reading connected text (Foorman et al., 2016). Decodable texts may be especially beneficial to students' word reading, especially for beginning readers (Mesmer, 2000). Students with disabilities also demonstrate a small to moderate benefit ($g = 0.20$ for word reading, $g = 0.30$ for pseudoword reading) from exposure to decodable texts (Murphy Odo, 2024).

While these findings specify what students should learn through phonics instruction, several other reviews characterize how teachers should instruct these skills. In short, reviews suggest explicit instruction is effective for teaching constrained skills, such as phonics (Al Otaiba et al., 2019; Petscher et al., 2020; Torgeson et al., 2017). Additionally, several reviews have questioned features of instruction including use of

Elkonin boxes (Ross & Joseph, 2019) and the potential benefit of technology (Silverman et al., 2024), including tablets (Parry et al., 2024). These studies suggest integrating technology into instruction can be helpful under certain conditions. Specifically, exposure to technology that can be individualized by the teacher (e.g., provide direct instruction needed by specific students, opportunities for repeated practice, and corrective feedback) can improve reading outcomes. Finally, while teachers require specialized phonics knowledge to effectively support student orthographic processing (e.g., Moats, 2014), scripted programs can enable paraprofessionals to effectively deliver interventions (Samson et al., 2015). Benefits from this evidence-based instruction appear to decrease, but sustain over time (Suggate, 2016).

Several syntheses have also considered phonics instruction for subpopulations of students including emergent bilinguals who are in the process of acquiring English-language proficiency and students with disabilities. Findings across these syntheses suggest that explicit instruction in evidence-based practices also benefits students with intellectual and multiple disabilities (Alquarini & Rao, 2019), multilingual learners (Kittle et al., 2024), and students experiencing reading difficulties and in need of intervention (Dilgard et al., 2022; Nilvius et al., 2021).

Taken together, this body of work suggests multiple factors, both at the student and teacher-level that affect phonics. These factors include:

- Phonological and phonemic awareness
- Automatic letter identification
- Grapheme-phoneme correspondence
- Understanding of common sound-spelling relationships
- Understanding of syllable types
- High frequency word vocabulary
- Letter writing fluency
- Instruction in or development of phonological/phonemic awareness or phonics in a student's native language
- Access to explicit instruction, provided by a trained instructor and with use of appropriate instructional material
- Use of Elkonin boxes within instruction
- Appropriate use of technology to supplement teacher-led instruction

Barriers

Barriers to phonics include anything that prevents the factors affecting phonics named above from being realized. These barriers are related to students themselves (e.g., their foundational understandings that serve as a basis for new learning) as well as to the teacher and school context. At the student level, students' ability to develop orthographic processing is dependent on several skills including automatic letter identification and phonological processing. As stated above, because students can continue to develop phonemic awareness as they receive phonics instruction, this skill does not need to be fully developed. However, because students rely more heavily on their phonological processing at the start of their journey toward reading proficiency, they must have foundational phonological and phonemic awareness before progressing to phonics instruction (Seidenberg & McClelland, 1989). Without these foundational skills, students will have difficulty building orthographic mapping and grapheme-phoneme correspondences (Stahl & Murray, 1994).

Additionally, students who have reading disabilities (e.g., dyslexia) likely will have difficulty forming the neural pathways necessary for connecting various processing regions in the brain. These students may need intensive intervention in evidence-based practices that is both explicit and sustained to develop connections between letters and sounds they can use to decode. When schools are able to overcome these barriers and provide intensive intervention, students can and do benefit (Slavin et al., 2011; Vaughn & Wanzek, 2014). Finally, the educational histories of emergent bilinguals should be taken into account when making instructional decisions for this student population. If students have received phonics instruction in a different language, the skills they have acquired will likely transfer to English, especially when this language is of similar origin (i.e., an Indo-European language, Melby-Lervåg & Lervåg, 2011). As such, failing to take advantage of students' linguistic resources is a barrier to their reading development (Adesope et al., 2010).

Although children experiencing reading difficulties and disabilities likely require explicit instruction and intervention on evidence-based practices, all students can benefit from this form of instruction (Torgerson et al., 2019). As such, a barrier to student development of word reading skills includes ineffective phonics instruction. This instruction may be characterized by an inappropriate sequence of sounds (e.g., sounds that are lower utility being introduced first or inviting student confusion by teaching together sounds that are visually or auditorily similar—/b/ and /d/ for example), a lack of repeated practice or infrequent exposure to novel sounds, as well as insufficient formative assessments that limit teachers' ability to understand what skills students have mastered and differentiate those that need further instruction and practice (Dilgard et al., 2022).

To deliver effective phonics instruction teachers also require specialized phonics knowledge including a fully developed sense of orthographic mapping and rules that govern the combination of letters and syllables in words. Because many currently practicing teachers neither received phonics instruction as they themselves were learning to read nor learned phonics in their teacher education programs, building this specialized knowledge requires professional development (PD) and coaching to produce changes in their instructional practices (Ehri & Flugman, 2018; Kraft et al., 2018; Moats, 2014). Through packaged PD programs such as LETRS® (Moats & Tolman, 2019) more teachers are accessing needed PD but this lack of specialized knowledge and the ability to implement it through instruction remains a barrier to effective phonics instruction.

Finally, curricular materials may impede delivery of effective phonics instruction and limit student word reading. Many curricular programs, including widely used Writers Workshop (Calkins, 1986) and Leveled Literacy Intervention (Fountas & Pinnell, 2009) aligned with balanced literacy and taught students to overly rely on context to decipher unknown words. Reliance on context often produced student guessing and errors, which both reduced student ability to read a text with understanding and also impeded their ability to develop needed decoding skills. Students exposed to this form of instruction were more likely to have long-term deficits in word reading abilities that produced inefficient word reading and weak comprehension skills (Osborne & Lehr, 1998). As many states have passed reading legislation and provided funds needed to buy new curricular programs, teachers' phonics instruction has improved (Neuman et al., 2023). However, even with appropriate instructional materials, teachers and school leaders should ensure students are not spending too much time learning to read isolated words. Students must have opportunities to read words in context, including seeing novel sounds in connected text. Exposure to decodable texts can be especially useful to students acquiring phonics. Phonics should also be a component of foundational reading instruction, not the totality if it. Students should build language and content knowledge through read alouds, should have time to learn new and complex vocabulary words, and should build fluency through repeated readings and other evidence-based fluency instruction.

Research Questions:

1. What instructional and intervention characteristics (e.g., use of Elkonin boxes, multicomponent instruction, intervention dosage, group size, implementer, modality) and student characteristics (e.g., age, English Learner, disability status) have been tested as part of phonics interventions or practices?

2. What does the research say about the effectiveness of phonics instruction in improving foundational reading outcomes for readers in grades K-3?

3. What features of instructional interventions or practices (e.g., type of instruction, duration, grade level) are associated with improved outcomes? Do these features differ according to student characteristics?

Method

Eligible Populations

In this review, the following populations were of interest:

- Grade range. Students in kindergarten through third grade (ages 5 years 0 months, through 9 years 11 months), or in any subset of these grades. Studies that contain students in other grades will not be included unless (a) study reports disaggregated results for students in eligible grades, or (b) students in eligible grades represent the majority of the aggregated mixed-age sample. If the study does not make explicit the number of students in each grade, a study will be included if 50% or more of the grades included in the sample falls within the eligible grade range. If the study provides only the mean age of the sample without any grade information, the mean age must be larger than 5 years 0 months but smaller than 9.5 years (9 years 6 months).

- Location. Studies must be written in English and take place in United States/U.S. and its territories, Canada, Australia, Ireland, New Zealand, United Kingdom. Additionally, the study location can include the following locations: school-based, school, classroom, public school, private school, early childhood center, home, clinic.

Eligible Interventions

The review considered studies of comprehensive or supplemental curricula or replicable instructional strategies for teaching phonics to students in kindergarten through 3rd grade. These included strategies or curricula used by teachers in general education classrooms, those used by reading coaches in the school, or those for use by paraprofessional educators, tutors, or parents.

The following characteristics of an intervention must be known to reliably reproduce the intervention with different participants, in other settings, and at other times:

- Intervention description: skills being targeted, approach to enhancing the skill(s) (e.g., strategies, activities, and materials), unit of delivery of the intervention (for example, whole group, individual), medium/media of delivery (for example, teacher-led instruction or software), and targeted population.
- Intervention duration and intensity.
- Description of individuals delivering or administering the intervention.

In this review, the following types of interventions were included:

- Curricula. A curriculum is a set of activities, materials, and/or guidance for working with students in classrooms. A curriculum has a clearly identified name, includes a write-up/description, and can be replicated by others based on written guidance, staff training, or technical assistance (for example, The Me Book). A curriculum may be (1) intended as the primary instructional tool designed to meet children's learning needs in multiple areas; or (2) designed to supplement the classroom material with differentiated instruction or meet children's learning needs in specific areas. Both types of curricula will be included in this review.
- Practices. A practice is a named approach to promoting children's development that educators implement by interacting with children and materials in classrooms. The review will include named practices that are clearly described, commonly understood, and used in published works by more than one investigator or team of investigators. Several terms may be used in the literature to refer to the same practice. A named practice may also refer to an array of specific procedures.

The review excluded (1) practices related to professional development, teacher preparation, and textbook design issues, and (2) other interventions not appropriate for a teacher's practice guide on reading, such as comprehensive school reform.

- Both “branded” and “non-branded” interventions were reviewed. Branded interventions are commercial or published practices that may possess any of the following characteristics:

- An external developer who provides technical assistance (e.g., instructions/guidance on the implementation of the intervention) or sells or distributes the intervention.
- Trademark or copyright.

Eligible Research

The following additional parameters defined the scope of research studies to be included:

- Topic. The recommendations will focus on instructional strategies that improve the phonics skills of children in kindergarten through grade three.
- Time frame. The study must have been published between 2014 and present.
- Sample. The study sample must meet the requirements described in the “Eligible Populations” section above.
- Language. The study must be available in English to be included in the review. Studies examining instruction in other languages will not be included in the review.
- Location. Location must meet the requirements described in the “Eligible Populations” section above.
- Publication. Conference papers and dissertations are ineligible.

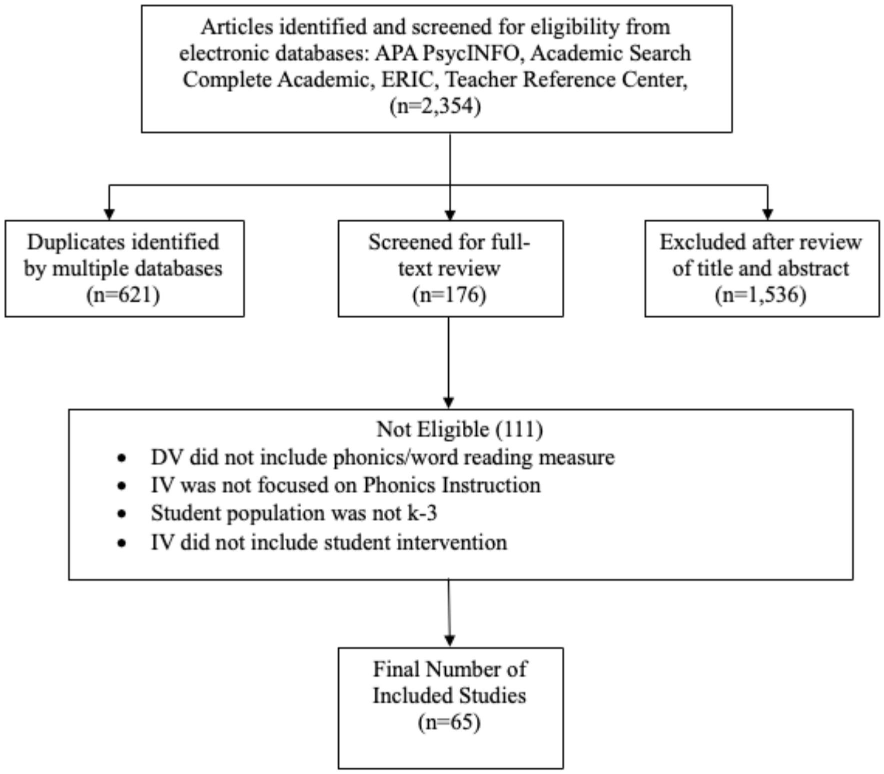
Eligible Outcomes

This review included at least one outcome related to intervention, instruction, strategy, curriculum, program, treatment on word reading achievement.

Search Strategy

Studies were identified using an electronic search of widely used educational and social sciences databases, including Academic Search Complete, APA PsycInfo, ERIC, and Teacher Reference Center. The complete search string is available upon request. This electronic search yielded 2,534. A two-step process was then used to screen articles. Based on the review of title and abstracts, studies were excluded if they did not include at least one outcome related to phonics/word reading; the intervention/practice was not focused on phonics instruction; student population was not k-3; the intervention/practice did not include a student intervention. After screening, the remaining 201 articles were thoroughly reviewed to determine if they met inclusion criteria; 65 articles met these criteria (see figure 1).

Figure 1. PRISMA diagram



Coding Procedure

After coding was complete for all 65 articles, key information and findings were categorized into 3 tables.

- Table 1 provides an overview of the demographics of participants and methods for the included studies. Information reported in Table 1 include study design, description of student participants (including grade level, students with disabilities, general education, and multilingual students), the persons responsible for implementing the intervention, dosage including frequency and duration, and if the study evaluated a specific curriculum and the name of that curriculum.
- Table 2 outlines the instructional components described in each included study. We organized this table to identify any instructional component used in each study according to the five pillars of reading instruction (i.e., phonemic awareness, phonics, fluency, vocabulary, and comprehension; National Reading Panel, 2001). In addition to the instructional strategies aligned to the five pillars, we also described if spelling and writing components were used and what instructional strategies were utilized in studies (i.e., explicit instruction, goal setting, incremental rehearsal, constant time delay).

- Table 3 was created to categorize what level of instruction the study described (i.e., Tier 1, 2 or 3) and the effect. The effects of the studies were described exactly how they were reported in each study. Additionally, within this table, we described the intervention as well as the comparison group when applicable.

Once the results were aggregated into the tables, an analysis was completed to better understand the results. Further analysis was conducted to best understand the effects for different student populations and instructional strategies.

Results

Characteristics of Reviewed Studies

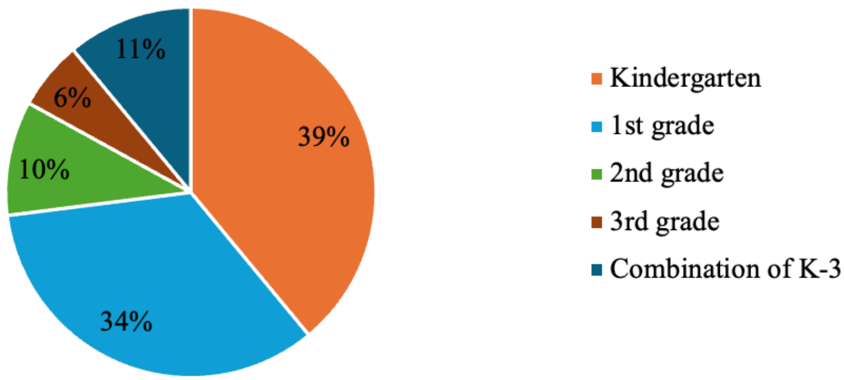
The first research question sought to understand the instructional and intervention characteristics used in qualified studies to evaluate phonics instruction from December 2014 through December 2024.

> *Research question 1: What instructional and intervention characteristics (e.g., specific curricula, multicomponent instruction, intervention dosage, group size, implementer, modality) and student characteristics (e.g., grade-level, English Learner, disability status) have been tested as part of phonics interventions or practices?*

Table 1 provides an overview of each student's demographics, including research design, student demographics, implementer, dosage, and curriculum. A total of 65 studies met the inclusion criteria. Of those 65 studies, 37% (n = 24) were randomized-controlled trials, 25% (n = 16) were quasi-experimental (e.g., comparison), and 23% (n = 15) were single-case research designs (e.g., multiple baseline, multiple probe, reversal, and alternating treatments design). Five studies (7%) used a pre-test/post-test design, two studies (3%) used a regression discontinuity design, two studies (3%) used a longitudinal effectiveness design, and one study (2%) used a within-subjects group design.

A total of 17,886 students were represented across 65 research studies focused on phonics-related interventions. The majority of the students who received phonics interventions were kindergarten students, representing 39% (n = 6,939). The next largest group of students that received intervention were 1st graders, representing 34% of students (n = 6,106), followed by 2nd grade with 10% (n = 1,836) of students receiving intervention, and 6% of the participants were in 3rd grade (n = 1,022). Several students reported a range of student participants (i.e., students in 2nd and 3rd grade) which represented 11% of the students receiving intervention (n = 1,972). The student population was also diverse, with unique needs (see figure 2).

Figure 2. Student Demographics

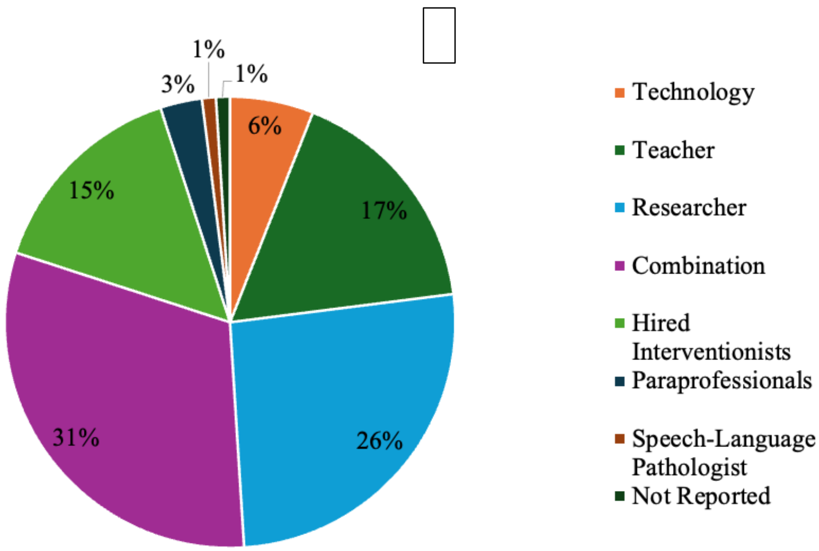


Nearly half of the studies (49%; n = 32) included students who were identified as at risk (which represented 16% of the total students that received intervention; n = 2,775). Multilingual students represented 16% (n = 2,775) of the students across 26 studies (40%). Lastly, 38% (n = 25) of the studies included students with disabilities, representing only 3% (n = 609) of the participating students who received intervention. Several studies did not report details about student demographics; therefore, the researchers reported what was described in the study descriptions.

We also coded the intervention dosage, including time of each intervention session, frequency, and the number of weeks the intervention occurred. Of the 65 included studies, 52% of studies (n = 34) included the dosage of minutes, day of the week, and number of weeks the intervention occurred; 40% of included studies (n = 26) reported a combination of minutes, days, or weeks; and 9% (n = 6) of studies did not report dosage. The average length of intervention for studies that reported dosage was 32 minutes per session, 3.5 days a week, over 14 weeks. The reported range of interventions was wide (range = 5-90 min; 8 sessions-2 school years).

We coded for the implementer of the intervention (i.e., researcher, teacher, technology, paraprofessional, hired interventionist, and other). Most of the studies used a combination of implementers (e.g., teacher and researcher, or paraprofessional and hired interventionists; n = 20; 31%), 26% of the studies (n = 17) utilized researchers (including researchers, doctoral students, or a team of researchers) as the interventionists, teachers served as the implementers in 17% (n = 11), hired interventionists were used in 15% of students (n = 10), and technology alone was the implementer in 6% of the students (n = 4), paras were used in two studies, and speech and language pathologists implemented the intervention in one study (see figure 3).

Figure 3. Intervention Implementers



Across all studies, 29 different curriculums were evaluated (i.e., GoTalk Phonics, UFLI Intensive Intervention, Proactive Early Interventions in Reading, IDEA Detectives, Guided Reading, Sound Partners & Sound Partners Plus, Tutoring Buddy Program, Road to Reading, Benchmark Word Detectives Programme, Enhanced Core Reading Instruction, The Simplicity Intervention Structured Word Inquiry Intervention, Reading Recovery, Integrated Group Reading, Triple Focus Program, Saxon Phonics, Word Construction, Funnix, PLATO, Fast Mapping Ostensive Naming, Build a Word- Easy Spelling with Phonics, Orton-Gillingham, Letters and Sounds Reading Reading Research, Early Reading Intervention, Reading Doctor, and Words their Way). Most studies, however, used a researcher-created intervention (60%, *n* = 39).

We coded for instructional components used throughout the studies aligned to the 5 pillars of reading instruction (i.e., phonemic awareness, phonics, fluency, vocabulary, and comprehension) as well as spelling/writing. Given the focus for this review was phonics, all studies used phonics-focused instructional strategies. The most commonly used phonics instructional components were letter sound recognition (*n* = 38), letter identification (*n* = 15), high frequency sight words (*n* = 19), focus on accuracy (*n* = 10), nonsense words (*n* = 9), and morphological awareness (*n* = 9; see figure 4). For the phonological awareness components, several studies (*n* = 44) used phoneme blending, phoneme segmentation (*n* = 33), and phoneme isolation (*n* = 19) strategies (see figure 5). Several studies also included comprehension strategies, specifically, nearly half the studies incorporated reading connected texts (*n* = 27) into their methods (see Figure 6). Fluency components were also used across several studies including repeated readings (*n* = 8) and explicit fluency instruction (n = 19; See Figure 7). Additionally, vocabulary instruction such as pre-teaching words needed to understand a story (Fuchs et al., 2019) and developing oral language by supporting students in using novel words in context (Coyne et al., 2018) was used in 19 studies (Figure 8). Finally, writing and spelling was used in a limited number of studies and these strategies included encoding/spelling (n = 18), writing words (n = 18), and sentence writing (n = 7; see figure 9).

Figure 4. Phonics Instructional Components

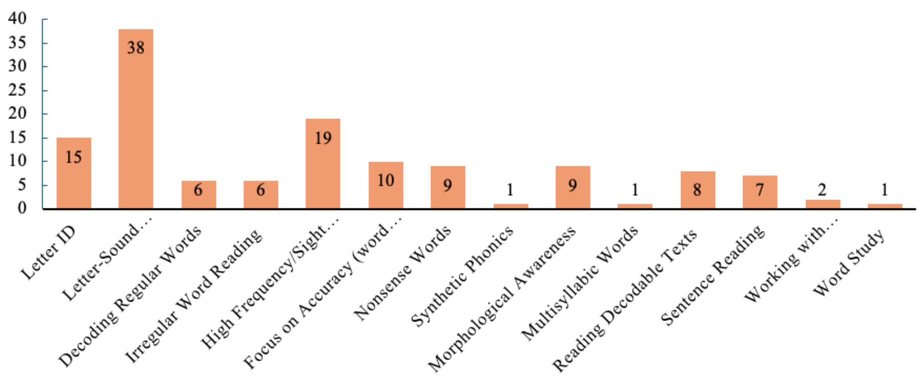


Figure 5. Phonological Awareness Instructional Components

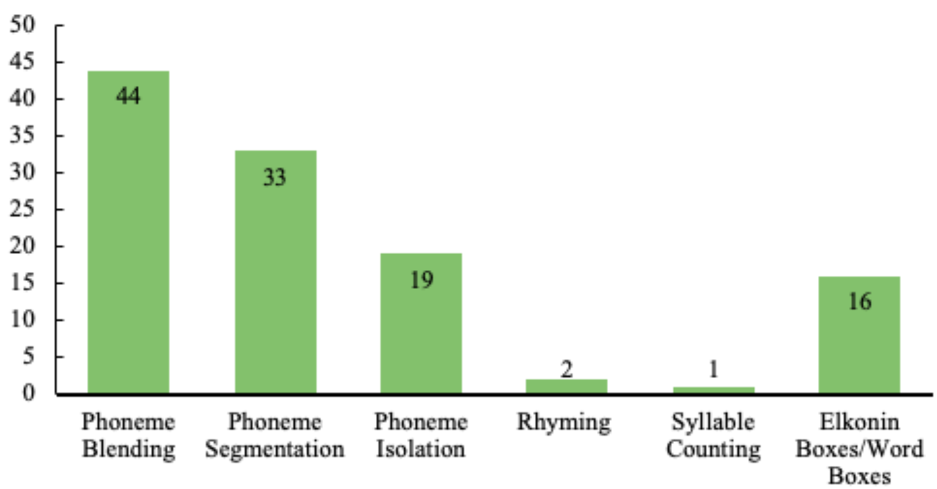


Figure 6. Comprehension Instructional Components

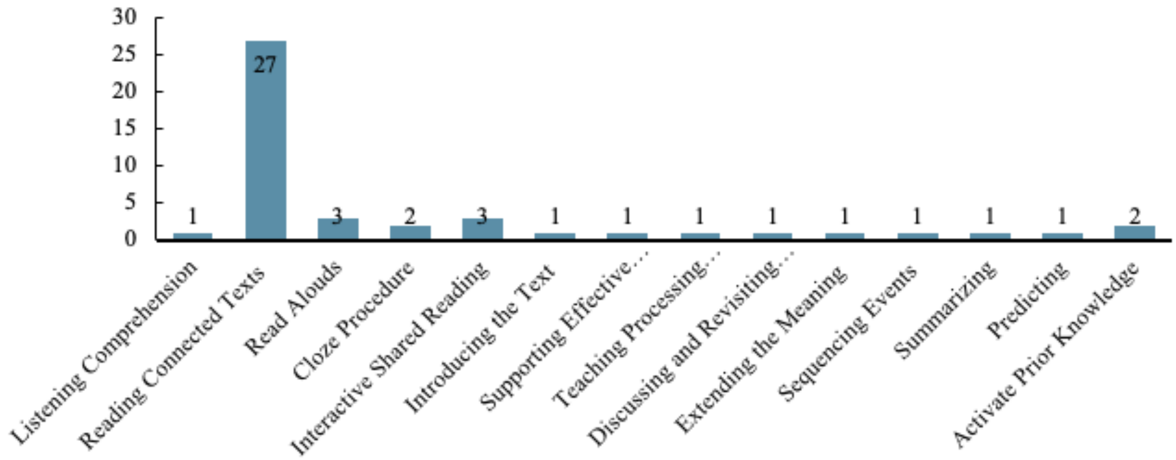


Figure 7. Fluency Instructional Components

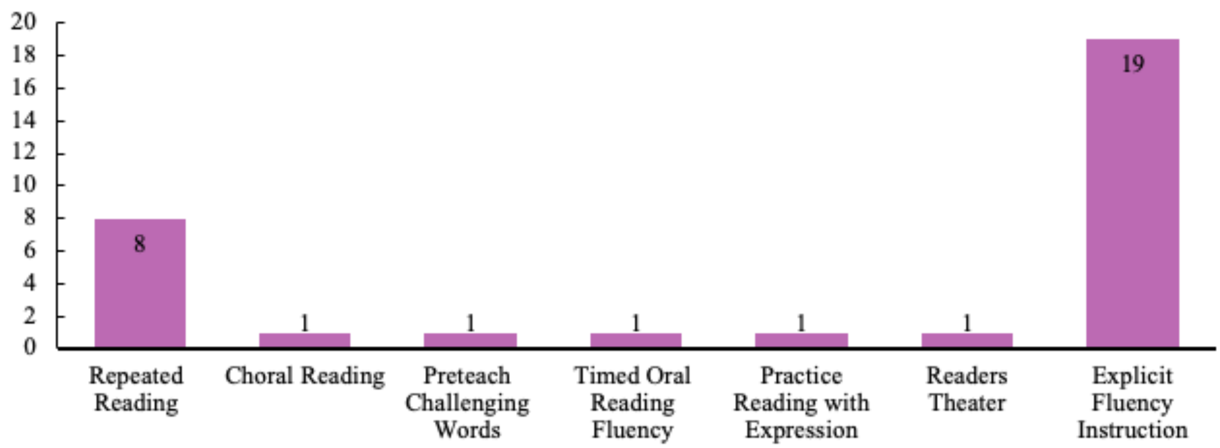


Figure 8. Vocabulary Instructional Components

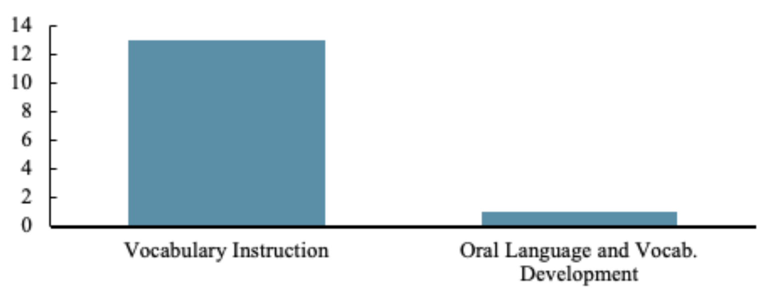
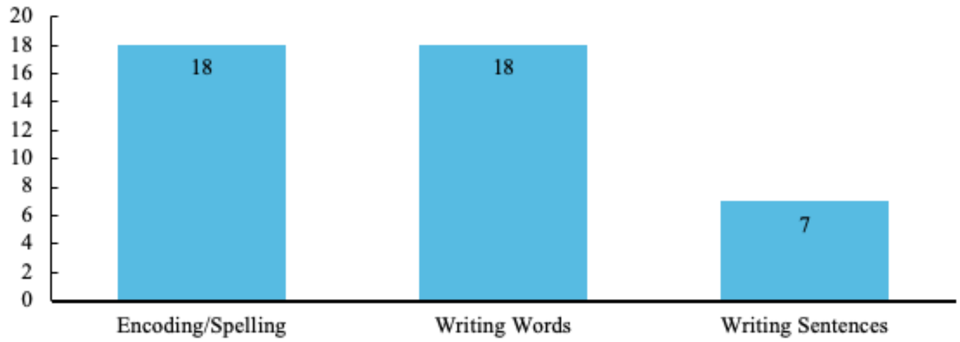


Figure 9. Spelling/Writing Components



The second research question aims to understand what the research says about the effectiveness of phonics instruction for improving foundational reading outcomes.

> *Research question 2: What does the research say about the effectiveness of phonics instruction in improving foundational reading outcomes for readers in grades K-3?*

To answer this question, the sections below were synthesized from information collected in tables 1, 2, and 3. First, we analyzed the intervention tiers, specifically, the different student demographics that received intervention within those tiers. Next, we evaluated the dimensions of those interventions (i.e., dosage, implementor, and curriculum). Finally, we synthesized which studies had the most effective results across those tiered interventions.

Tiers 1 and 2

Across all included studies, only four studies were conducted as a Tier 1 intervention, 30 studies occurred in small group or Tier 2, and the majority of studies, (*n* = 35) were conducted in a Tier 3 setting (small group or one on one). Within those tiers, few studies included kindergarten students within Tiers 1 and 2. Three Tier 1 studies and 17 Tier 2 studies included 1^{st} grade participants. Second grade students were primarily included in Tier 2 studies (*n* = 14) and two studies in Tier 1. However, third grade students only received intervention in Tiers 2 and 3.

As described above, the average length of intervention for studies that reported dosage was 32 minutes per session, 3.5 days a week, over 14 weeks with a range of (range = 5-90 min; 8 sessions-2 school years). Larabee et al., (2014) had the smallest dosage with four 19-minute sessions and Peterson, et al., (2019) provided intervention 1 times a week for 4 weeks. The longest reported student was Harmey & Anders (2023) that had a duration of 2 years. Most studies lasted around 10 weeks, met for multiple times a week for roughly 30 minutes per session.

Next, we analyzed the results to better understand the components used in the studies with positive effects. Across all studies in Tier 1 and 2 instruction, 28 studies demonstrated positive effects. Specifically, in there were 3 studies that showed positive phonics outcomes for students in Tier 1 (Cheathan et al., 2014; Russell & Shiffler, 2019; Young et al., 2019). Across those three studies, only one component was utilized in two studies (explicit instruction) and seven other components were found in one of each of these studies (phoneme blending, phoneme segmentation, phoneme isolation, reading connected text, readers theater, encoding/spelling, and using manipulatives).

There were 25 studies that demonstrated positive phonics results for Tier 2 interventions. The components that were most frequently used across effective Tier 2 studies include explicit instruction (*n* = 23), blending phonemes (*n* = 13), letter sound correspondence (*n* = 12), reading connected texts (*n* = 11), encoding/spelling (n = 10), segmentation (*n* = 9), and fluency instruction and word writing each were used across 7 studies (see figure 9). Given the focus of this literature review was effective phonics instruction, we coded the most commonly used phonics-specific components across Tier 2 interventions with positive outcomes. Across the 25 studies, 12 studies used letter-sound correspondence strategies, eight studies included high-frequency sight words, letter ID and morphological awareness strategies were used across six studies, four studies included reading decodable texts linked to focus words and nonsense-word instruction, two studies used decoding regulars words, irregular word reading, multisyllabic word reading, and word building, and synthetic phonics, sentence reading, and word study were each used in one study (see Figures 10 & 11).

Further, studies that observed positive effects in Tiers 1 and 2 tended to observe benefits for word level reading including word id, nonsense word reading, sight word reading. Some studies also observed positive effects on comprehension (Young et al., 2019; Burns et al., 2020 & 2022; Denton et al., 2014; Partanen et al., 2018; Savage, 2024; and Zugel, 2020).

Tier 3

Of the 33 studies that provided Tier 3 interventions, 25 studies had positive phonics outcomes for students. Of those 25 studies, explicit instruction was used in every study, 17 studies included blending phonemes, 14 studies included segmenting phonemes, 13 studies included letter sound correspondence instruction, eight studies included encoding/spelling instruction, eight studies practiced isolating phonemes, and seven studies used Elkonin/words boxes. See Figure 12.

It should be noted that nearly half the studies in Tier 3 were single-case research designs that included students with disabilities, therefore, the interventions were more targeted to individual student needs and skills. Additionally, several of studies in Tier 3 with positive outcomes did not use a specific curriculum, rather the instructional procedures were developed by the researcher. For example, Wook Ok et al., (2021) used video self-modeling to improve phonics skills and Petersen-Brown & Burns (2019) and Rahn et al., (2015) used Incremental Rehearsal (IR) to improve phonics skills in students. The curriculums that were used include: GoTalk Phonics (Ahlgrim-Delzell et al., 2014), IL Literacy (Cassady et al., 2018), UFLI-Intensive Intervention (Contesse et al., 2021), Tutoring Buddy (Dubois et al., 2014), Simplicity Intervention and Structured Word Inquiry (Georgiou et al., 2021), Word Construction (Parker et al., 2020), Funnix (Pindiprolu & Marks, 2020), Fast Mapping and Ostensive Naming (Pomper et al., 2022), Build a Word Easy Spelling (Ross & Joseph, 2020), the Reading Doctor (Winn et al., 2020). Most of these studies had a multi-component package that had some explicit instruction to improve word reading. However, while some studies showed positive results for all participants, some studies demonstrated growth for only some. It should also be noted that most of these intervention packages rarely focused on the phonics components, and rather, included a phonemic and phonological awareness and fluency components along with the phonics instruction (See Figure 13).

Nearly half of the studies that showed positive outcomes for students in Tier 3 used letter-sound within their instruction (n=13). The next most commonly found phonics-specific components were letter identification, high frequency sight words, and non-sense words (See Figure 12). Interestingly, some studies (i.e., Alber-Morgan et al., 2016; Fuchs et al., 2019; Peterson-Brown & Burns 2019; Stocker et al., 2023) had interventions that focused on other components such as phonemic awareness or fluency but had showed positive outcomes in students' word reading skills.

In general, studies situated within Tier 3 had more intensive dosage but over a shorter time frame. Most studies had sessions of less than 20 minutes multiple times a week for a series of weeks. Larabee et al., (2014) had the smallest dosage with four 19-minute sessions and Bradley and Noell provided eight sessions (2018) in total. Rahn and colleagues had an intervention with longer duration. They provided 1:1 instruction daily for 10-15 minutes per session over 17 weeks. As before, dosage did not appear related to intervention effectiveness.

Figure 10. Most Commonly Used Components in Effective Tier 2

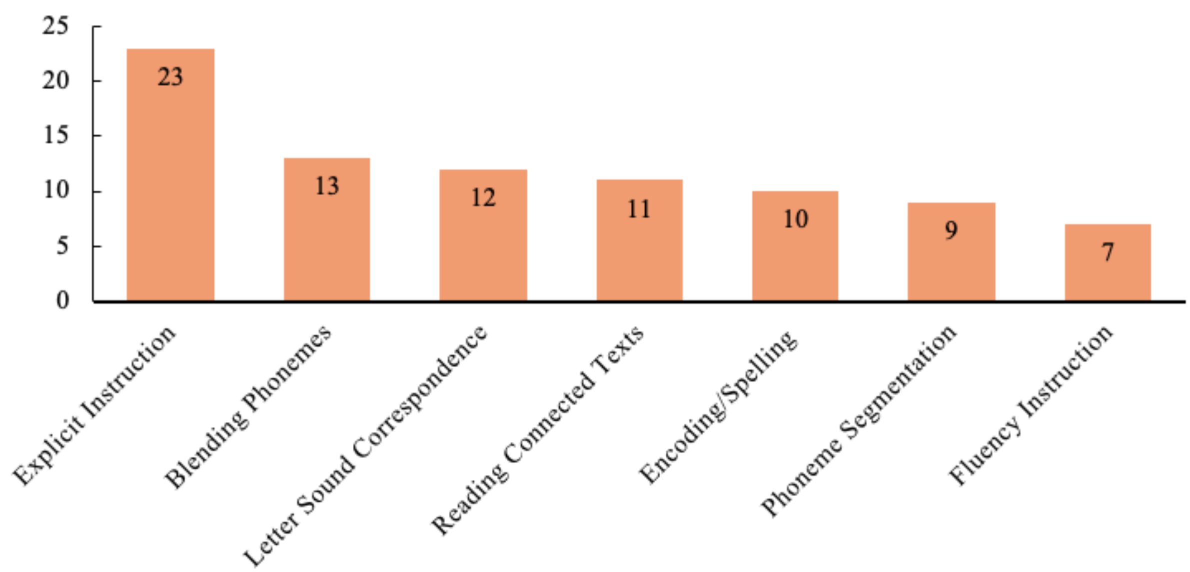


Figure 11. Most Frequently Used Phonics-Specific Components in Tier 2

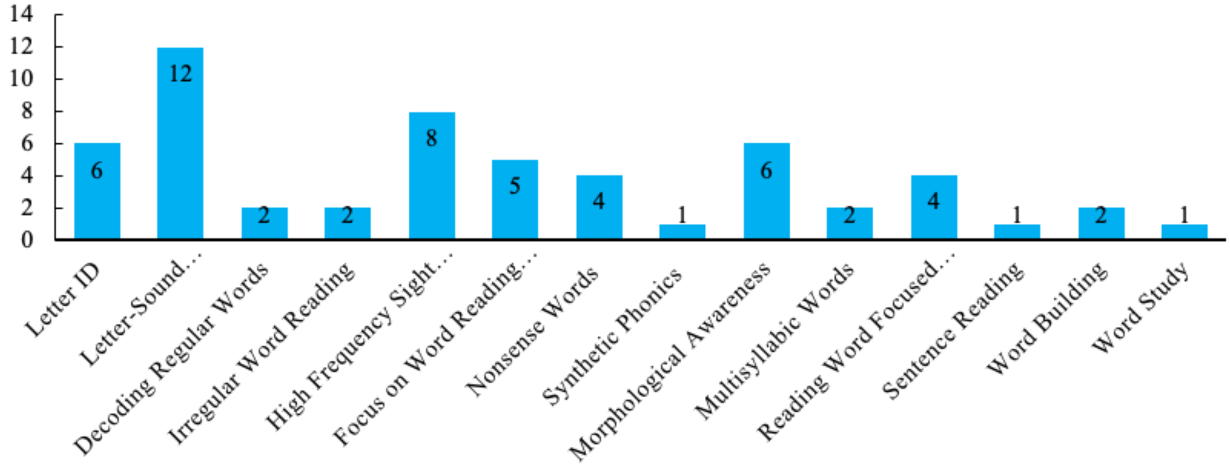


Figure 12. Most Commonly Used Components in Effective Tier 3

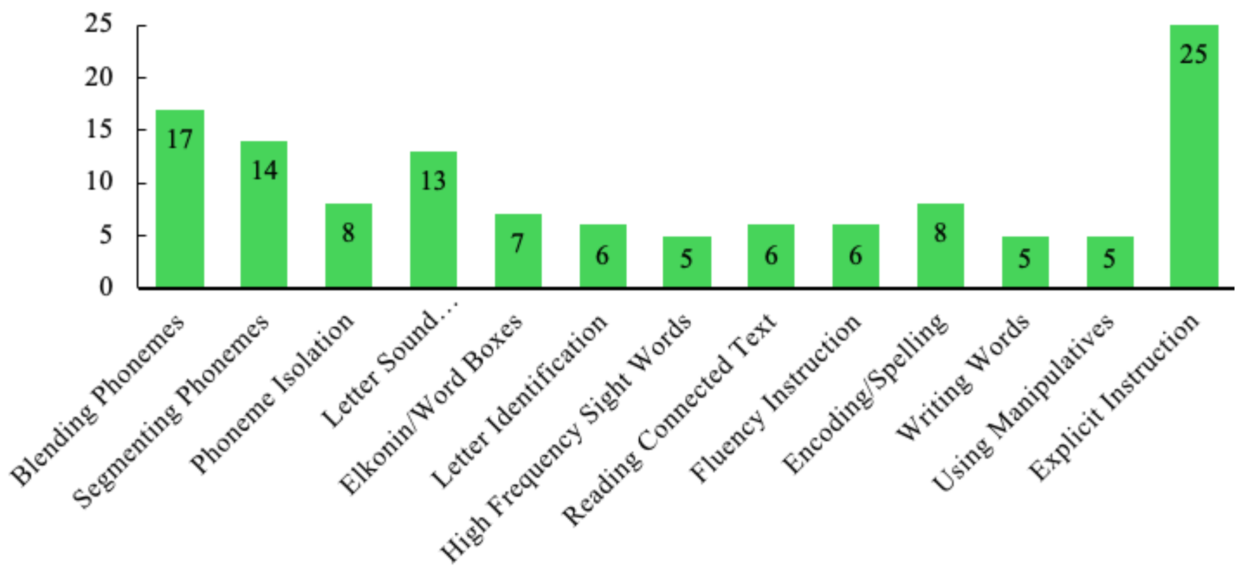
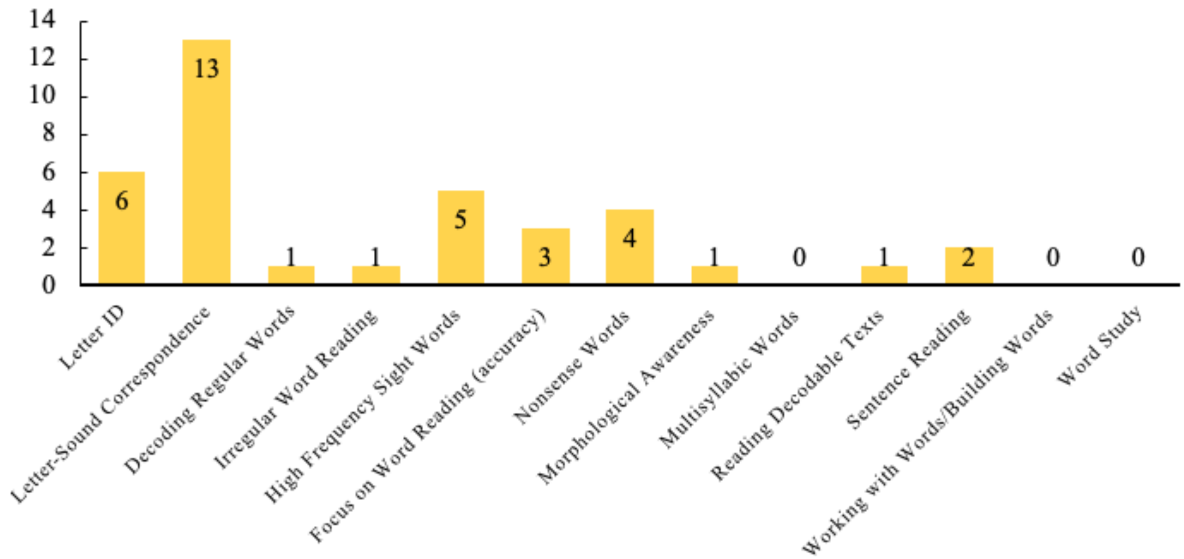


Figure 13. Phonics-Specific Components in Effective Tier 3



The third research question aimed at the identification of specific features that correlated with improved word reading outcomes:

> *Research question 3: What features of instructional interventions or practices (e.g., type of instruction, duration, grade level) are associated with improved outcomes? Do these features differ according to student characteristics?*

To answer this question, the sections below include intervention features that were effective for multilingual learners, students with disabilities, and students at risk for difficulties. Details regarding tiered interventions 1, 2, and 3 can be found in table 3 and will be discussed within each subgroup.

Multilingual Learners

A total of 15 studies included multilingual learners (ML) in their participant demographics: one study involving Tier 1, eight studies involving Tier 2, and five studies involving Tier 3. Young et al. (2019) was the lone study associated with Tier 1 instruction with study participants consisting of 38 students assigned to the treatment group (21% identified as ML) and 38 students in the comparison group (18% identified as ML). The Readers' Theater intervention examined in the study revealed no statistically significant differences in word reading outcomes (i.e., decoding, word knowledge). These results are not surprising as Readers' Theater is a fluency building intervention that has shown to be effective on outcomes related to fluency and comprehension.

The percentage of ML participants among the seven Tier 2 studies ranged from 9.6% (Burns et al., 2024) to 53.8% (Dussling, 2020a; Dussling, 2020b). A majority of these studies reported positive results for multi-component interventions that incorporated 15-30 min. explicit code-based instruction in a small group setting for 4-5 days per week. Dussling et al. (2020b) was the lone study to report word reading outcomes specifically for ML students. Their analysis of the explicit code-based intervention, Road to Reading, showed both at-risk MLs and native English-speakers made statistically significant growth during the intervention on all measures, with medium to large effect sizes. Harmey and Anders (2023) examined the effects of Reading Recovery (RR), an intervention program informed by literacy processing theory (Clay, 2001). Results indicated that participants who had the RR intervention before a Phonics Screening Check (PSC) performed better than participants who had the intervention during or after the PSC. Additionally, there was a positive and statistically significant increase in PSC performance among those whose RR intervention began earlier relative to the PSC.

The percentage of ML participants among the six Tier 3 studies ranged from 60% (DuBois et al., 2014) to 100% (Cassady, 2018; Frates, 2024; Rahn, 2015; Ross & Joseph, 2020). All of these studies reported positive results for interventions that incorporated individualized explicit code-based instruction with dosage ranging from an average of 2 min. (DuBois et al., 2014) to 20-30 min. (Frates et al., 2024). Additionally, three studies used computer assisted instruction for the intervention (DuBois et al., 2014; Larabee et al., 2014; Ross & Joseph, 2020).

Students with Disabilities

A total of 20 studies included students with disabilities (SWD) in their participant demographics: 7 studies involving Tier 2, and 13 studies involving Tier 3. The percentage of SWD participants among the seven Tier 2 studies ranged from 5.2% (Fien et al., 2021) to 100% (Brimo, 2016). A majority of these studies reported positive results for multi-component interventions that incorporated 15-30 min. explicit code-based instruction in a small group setting for 4-5 days per week. Although not included in the range, it should be noted there was one study, Partanen et al. (2019), that reported a dosage of 3.75 hours for 5 days a week. This study involved an intensive intervention that would typically be designated as Tier 3 but since it was not individualized instruction, it did not meet our criteria as such. Additionally, the only study that did not report positive results, Denton et al. (2021) was examining the development of a multi-component program. There were two studies that examined the Enhanced Core Reading Instruction (ECRI) intervention (Fien et al., 2021; Smith, 2016), which involved enhanced Tier 1 instruction with a highly aligned Tier 2 intervention. Both studies found that the ECRI intervention resulted in significant increases in reading achievement. Brimo (2016) was the lone study with only SWD as participants. The authors found there was a statistically significant difference between the explicit morphological awareness intervention group and the control group on tasks that measured students' ability to combine base words and affixes, to define multimorphemic words, and to judge use of a multimorphemic word in a sentence (d = 2.58).

The percentage of SWD participants among the 13 Tier 3 studies ranged from 4.2% (Bouton et al., 2018) to 100% (Ahlgrim-Delzell et al., 2014; Alber-Morgan et al., 2016; Frates et al., 2024; Joseph, 2018; Rahn et al., 2015; Stocker et al., 2023; Storkel et al., 2017). A majority of these studies reported positive results for interventions that incorporated individualized explicit code-based instruction with dosage ranging from an average of 5-8 mins. (Stocker et al., 2023) to 60 mins. (Contesse et al., 2021; Pomper et al., 2022). The participants in the studies included children with autism spectrum disorder (ASD), Down syndrome, dyslexia, attention-deficit/hyperactivity disorder (ADHD), specific language impairment (SLI), and developmental language disorder (DLD). Additionally, studies showed positive results for interventions that incorporated instructional techniques such as computer assisted instruction paired with a communication device (Ahlgrim-Delzell et al., 2014), word boxes (Alber-Morgan et al., 2016; Joseph, 2018); and incremental rehearsal (Rahn et al., 2015).

Students At Risk

A total of 35 studies included students identified at risk: 3 studies involving Tier I, 15 studies involving Tier 2, and 17 studies involving Tier 3. The percentage of SAR participants among the three Tier 1 studies ranged from 17.7% (Cheatham et al., 2014) to 43.3% (Russell & Shiffler). Two of the three studies suggested preliminary support for practices such as providing independent practice of multiple-criteria text that targeted high-frequency words, decodability, and meaningfulness (Cheatham et al., 2014) and implementing a metacognitive flexibility-based phonological intervention designed to mitigate the effects of dialect differences and phonological awareness among African American boys (Russell & Shiffler, 2019).

The percentage of SAR participants among the three Tier 2 studies ranged from 18.4% (Burns et al., 2020) to 100% (Dussling, 2020a; Dussling, 2020b; Evans et al., 2014; Fien et al., 2015; Fein et al., 2021; Foorman et al., 2017; Harmey & Anders, 2023; Park et al., 2020; Pullen & Lane, 2014; Solari et al., 2018; Vanderwood et al., 2014). A majority of these studies reported positive results for both single and multi-component interventions that incorporated 15-60 min. explicit code-based instruction in a small group setting for 4-5 days per week. Positive results were also reported for an intervention program, Reading Recovery, informed by literacy processing theory (Harmey & Anders, 2023) and ABRACADABRA, a balanced literacy program (Vousden et al., 2022).

In addition to overall effectiveness of programs and/or practices, a few studies compared types of delivery. Burns et al. (2020) investigated the impacts of a targeted intervention (research-based program), non-targeted intervention (double-dose of Tier 1 instruction), and proficient readers (above 40th percentile; not receiving supplemental support. They reported that students who received the targeted intervention had a statistically significantly higher rate of growth from fall to winter as compared to students with similar reading skills but who did not receive a targeted intervention, and they increased at a rate that was similar to proficient reader. Foorman et al. (2017) investigated the difference between stand alone and embedded early literacy programs. The authors reported that the stand-alone intervention significantly improved spelling outcomes relative to the embedded intervention, but impacts on other student outcomes were similar for the two interventions. Pullen & Lane (2014) compared decontextualized, teacher directed decoding practice with manipulative letters and embedded, incidental decoding practice. The study results suggested that students who received the additional decoding practice with manipulative letters scored significantly better on phonological awareness, decoding, and word recognition skills than students who received incidental decoding practice.

The percentage of SAR participants among the three Tier 3 studies ranged from 47.7% (Vandasy & Sanders, 2021b) to 100% (Alber-Morgan et al., 2016; Bazis et al., 2022; Bouton et al., 2018; Bradley & Noell, 2018; Fuchs et al. 2019; Georgiou et al. 2021; Larabee et al., 2014; Lindo et al., 2018; Parker et al., 2020; Peterson-Brown & Burns, 2019; Pindiprolu & Marks, 2020; Vadasy & Sanders, 2021a; Vadasy et al., 2023; Vadasy & Sanders, 2023; Winn et al., 2020; Wook et al., 2021). A majority of these studies reported positive results for interventions that incorporated individualized explicit code-based instruction with dosage ranging from of 10-15 mins. (Peterson-Brown & Burns, 2019) to 45 mins. (Fuchs et al., 2019; Lindo et al., 2018). Studies showed positive results for interventions that incorporated instructional techniques such as constant time delay (Bradley & Noell, 2018), word boxes (Alber-Morgan et al., 2016; video modeling through an augmented reality iPad application (Wook et al., 2021), and incremental rehearsal (Peterson-Brown & Burns, 2019).

In addition to overall effectiveness of programs and/or practices, two studies examined the types of delivery. Lindo et al., (2018) examined whether tutors without prior teaching experience or instruction could improve student reading outcomes with minimal training (i.e, four 1-hour sessions), a structured reading curriculum, and access to ongoing coaching. The authors reported that tutored students displayed significantly more growth than control students in letter-word identification, decoding, and passage comprehension, with effect sizes of 0.99, 1.02, and 0.78. Pindiprolu and Marks (2020) reported positive results of two parent implemented computer-based reading programs.

Discussion

Discussion of Overall Independent Variable Effectiveness

The purpose of this literature review is to add to the existing literature found in the WWC practice guides of effective foundational reading instruction for students in grades kindergarten through third grade. The results of this literature review align with recent literature reviews on the effective instructional strategies for improving phonics outcomes for young children (please see KYRRC website for these reviews and their implications).

Moreover, results from this review extend the findings from the IES Practice Guide for Foundational Literacy released in 2016. The recommendations described in the Practice Guide related to phonics instruction includes teaching students to decode words, analyze word parts, write, and recognize words, specifically teach students to blend sounds to produce words, focus on sound-spelling patterns, recognize common word parts, read decodable texts, teach regular and irregular high frequency words, and introduce non-decodable words. Each of these skills was a commonly used component found in the 65 identified studies.

Strategies such as blending and segmenting phonemes and using word boxes to manipulate letter sounds were recommended in the practice guide, and were practices included in this review. However, only phoneme blending and letter-identification were found in more than half of the included studies.

Technology was used in a number of the included studies, mainly as a complement to teacher or researcher-delivered instruction within studies conducted in Tier 3. As these studies were largely effective in improving student foundational reading outcomes, our findings support those of extant meta-analyses. Specifically, in their recent literature reviews of the use of tablets and technology to teach phonemic awareness, phonics (Parry et al., 2024), and decoding skills (Silverman et al., 2023), researchers found that tablet-assisted instruction could help students gain a better understanding of the phonics concepts when paired with teacher guidance as well as when they are adaptive to individual student needs and provide feedback, .

Discussion of Components' Effectiveness

Of the studies that demonstrated the most effective results in all tiers, explicit instruction was a common instructional practice. Archer and Huges (2011) describe explicit instruction as (1) chunking information into manageable parts; (2) clearly stated instructional goals; (3) teacher modeling and a gradual release of responsibility for using a novel skill by engaging students in increasingly independent practice; and (4) clear and timely feedback to ensure student accuracy when practicing. The studies that demonstrated the most positive phonics outcomes used explicit instruction, which confirms findings from a variety of extant literature (Al Otaiba et al., 2019; Petscher et al., 2020; Torgeson et al., 2017). Noting the ubiquity of explicit instruction within interventions conducted across tiers suggests this modality of instruction can benefit students with extensive support needs; a finding in line with both Slavin and colleagues (2011) and Wanzek and Vaughn (2014) who demonstrated students.

Across the included studies, the majority of phonics interventions were conducted in Tier 3 settings (n = 35), followed by Tier 2 (n = 30), with only four studies implementing Tier 1 interventions. Within Tiers 1 and 2, few studies included kindergarten participants. First-grade students were represented in three Tier 1 and 17 Tier 2 studies, while second graders appeared primarily in Tier 2 (n = 14) and in two Tier 1 studies. Notably, third-grade students only received interventions in Tiers 2 and 3. The average intervention lasted 32 minutes per session, conducted 3.5 times weekly over approximately 14 weeks. Dosages ranged widely from brief interventions such as four 19-minute sessions (Larabee et al., 2014) to extended programs like the two-year intervention by Harmey and Anders (2023), though most studies lasted around 10 weeks and met several times weekly for about 30 minutes per session. This finding suggests that phonics is frequently positioned as an intervention that supports students who have either not received appropriate Tier 1 instruction delivered within the whole class context, or who have not responded appropriately to this instruction. Findings from existing reviews suggest that non-response may be the product of limited alphabetic knowledge (Ehri, 2005).

Among studies that demonstrated positive outcomes, 28 Tier 1 and 2 studies were identified as effective. In Tier 1, three studies showed improved phonics outcomes, incorporating components such as explicit instruction, phoneme blending and segmentation, and use of manipulatives. In Tier 2, 25 studies reported positive effects, frequently employing explicit instruction, phoneme blending, and letter-sound correspondence, among others. Phonics-specific strategies such as letter-sound correspondence, high-frequency sight word instruction, and morphological awareness were also consistently used. Additional strategies included decodable texts, nonsense word instruction, and multisyllabic word reading. These effective interventions were most associated with improvements in word-level reading skills—including word identification, nonsense word reading, and sight word reading—and in some cases, comprehension.

Most studies in Tier 3 with positive effects on phonics outcomes used explicit instruction to provide intensive, multi-component interventions. These interventions targeted students' phonological and phonemic awareness in addition to building their phonics skills, which suggests Tier 3 interventions are addressing precursor skills (such as alphabetic knowledge; Ehri, 2005) within their interventions.

Students at Risk

Across the 35 studies involving students identified as at risk (SAR), researchers investigated interventions at Tiers 1, 2, and 3. Tier 1 studies (n = 3) reported SAR participant percentages ranging from 17.7% to 43.3%. Two of the three studies showed promising outcomes for interventions emphasizing independent practice with high-frequency and decodable texts and a phonological intervention designed to accommodate dialectal differences among African American boys. In Tier 2 studies (n = 15), SAR representation ranged from 18.4% to 100%, with most studies reporting positive outcomes for interventions incorporating 15–60 minutes of explicit code-based instruction in small group formats 4–5 times weekly. Programs such as Reading Recovery and ABRACADABRA also demonstrated limited effectiveness. Some studies further explored delivery methods, such as Burns et al. (2020), who found targeted interventions outperformed non-targeted instruction, and Pullen and Lane (2014), who reported better decoding outcomes from teacher-directed decoding with manipulatives. Findings from the current review offer promising evidence that aligning Tier 1 instruction with Tier 2 intervention that is specifically targeted to student needs may be beneficial to students (Fien et al., 2021; Smith, 2016).

Among the 17 Tier 3 studies, SAR participation ranged from 47.7% to 100%. This is not surprising given that most tier 3 interventions target students with limited proficiency. The majority of these studies demonstrated significant improvements through individualized, explicit code-based instruction, with durations ranging from 10 to 45 minutes. Interventions employing instructional strategies such as constant time delay, Elkonin boxes, augmented reality applications, and incremental rehearsal, were associated with positive outcomes. Additionally, Lindo et al. (2018) found that minimally trained tutors could significantly improve students' reading outcomes, while Pindiprolu and Marks (2020) reported positive results from parent-implemented, computer-based reading programs. These findings suggest that both structured intervention design and flexible delivery formats can be effective in supporting SAR students across multiple tiers.

Multilingual Learners

Among the 15 studies including multilingual learners (ML), one study examined Tier 1 instruction, eight examined Tier 2, and six examined Tier 3. The sole Tier 1 study by Young et al. (2019) evaluated a Readers' Theater fluency intervention, finding no statistically significant effects on decoding or word knowledge. This outcome aligns with the intended focus of Readers' Theater, which primarily targets fluency and comprehension rather than foundational word reading skills. In contrast, the Tier 2 studies, which included between 9.6% and 53.8% ML participants, largely reported positive outcomes for multi-component interventions involving 15–30 minutes of explicit code-based instruction delivered in small groups, 4–5 days per week. Notably, Dussling (2020b) found significant word reading gains among both at-risk MLs and native English speakers using the *Road to Reading* program, with medium to large effect sizes. Additionally, Harmey and Anders (2023) reported that earlier implementation of the Reading Recovery intervention led to significantly higher Phonics Screening Check performance among MLs.

The six Tier 3 studies, which had ML representation ranging from 60% to 100%, consistently reported positive effects from individualized explicit code-based interventions. Dosage varied from brief sessions averaging 2 minutes (DuBois et al., 2014) to more intensive sessions lasting 20–30 minutes (Frates et al., 2024). Several studies, including DuBois et al. (2014), Larabee et al. (2014), and Ross and Joseph (2020), integrated computer-assisted instruction, demonstrating its utility in supporting ML students' word reading development. Overall, the findings suggest that targeted, explicit instruction—particularly when individualized and potentially supported by technology—is effective in improving word reading outcomes for ML students, especially within more intensive Tier 3 settings.

Students with Disabilities

Across 20 studies involving students with disabilities (SWD), the most effective strategies consistently involved explicit code-based instruction delivered with high intensity and structure. In Tier 2 interventions (n = 7), the majority of studies reported positive outcomes for multi-component programs implemented in small groups for 15–30 minutes, 4–5 days per week. Notably, Partanen et al. (2019) demonstrated strong effects with an intensive intervention delivered for 3.75 hours daily, although it was not classified as Tier 3 due to its group format. Enhanced Core Reading Instruction (ECRI), a highly aligned Tier 1 and 2 model, showed significant improvements in reading achievement. Studies that focusing solely on SWD, found a large effect (d = 2.58) for a morphological awareness intervention. Among the 13 Tier 3 studies, effective approaches included individualized explicit instruction with varied dosage, ranging from 5–8 minutes to 60 minutes. Positive outcomes were associated with techniques such as Elkonin boxes, incremental rehearsal, and technology-enhanced instruction, such as computer-assisted programs paired with communication devices. Collectively, these findings highlight the importance of structured, explicit instruction and, use of manipulatives, and individualized support in producing the highest gains for SWD.

Implications for Practice

Building on findings from the current review as well as those of extant syntheses, meta-analyses, and consensus reports, we can offer several implications for practice. First, because students' alphabetic knowledge appears to be a precursor skill to developing student phonics, students at the start of their elementary careers should build phonological and phonemic awareness as well as automaticity with letter identification and an understanding that all spoken sounds are represented by letters. Second, Tier 1 instruction that supports students' word identification, nonsense word reading, and sight word reading appears to improve word level reading. However, because there were no studies of Tier 1 high-quality instructional resources, such as those approved for use in the state of Kentucky, we argue that these instructional strategies likely complement a broader phonics program focused on developing students' ability to process orthographic information through, for example, phonemic awareness, grapheme-phoneme correspondence, blending, and segmenting (Torgerson et al., 2019). Third, because teachers require specialized knowledge to deliver this form of instruction (Moats, 2014), an implication for practice includes providing professional development such as LETRS® to enhance teachers' understanding of how the brain learns to read and how their instruction can most efficiently and effectively create neural pathways that process orthographic information (Seidenberg & McClelland, 1989).

Implications for English Learners, Students with Disabilities, and Students at Risk

The findings from the present review suggest that for ML students, especially those receiving Tier 2 and Tier 3 support, explicit code-based instruction delivered as part of multicomponent interventions within small or individualized settings. Instructional planning should prioritize structured, systematic phonics-based interventions with sufficient intensity and duration, particularly in Tiers 2 and 3, where ML representation is higher and effects are more pronounced. Furthermore, capitalizing on students' linguistic assets through, for example, integration of cognates into instruction can increase outcomes (Melby-Lervåg & Lervåg, 2011). Given the limited impact of fluency-focused interventions like Readers' Theater on decoding outcomes, educators should align instructional strategies with specific literacy goals and student needs, especially for ML learners.

These findings also indicate that students with or at risk for reading difficulties or disabilities benefit from explicit code-based interventions, particularly when instruction is individualized (Tier 3) or delivered in small groups (Tier 2) with sufficient frequency and duration so as to improve outcomes (Slavin et al., 2011; Wanzek & Vaughn, 2014). These students appear to benefit from multicomponent intervention programs that include both phonemic awareness instruction and explicit, systematic phonics instruction that includes blending, segmenting, and use of Elkonian boxes and manipulatives. Instructional planning should incorporate evidence-based components such as morphological awareness, enhanced core reading instruction, and perhaps computer-assisted support that is provided in tandem with teacher-led instruction and tailored to specific learning needs. Educators should consider aligning intervention across whole- and small-group settings which can provide multiple exposures across contexts that may be needed for mastery.

Limitations

There were some limitations with this review. First, our intention was to include only studies that had phonics-related instruction and outcomes. This may have limited our scope and inclusion of studies that did, in fact, improve word-reading outcomes that were not explicitly measured. Second, out review was limited to the description provided in the manuscript to determine what instructional components were used in the methods. Some studies provided an overview of a curriculum but provided little description of the actual intervention, therefore, we were limited on what we could report as the components. When there was a lack of information provided, the authors had to resort to searching the specific curriculums to gain a better understanding of the curriculum instructional components. This lack of detail in description may have impeded the accuracy of the description and results. Finally, the scope of this review was not to complete a meta-analysis; rather, our focus was to synthesize the effects and results as reported by the authors.

Future Research

Most studies in this review included components across all five pillars of effective reading instruction, therefore, it is hard to draw conclusions of what specific components were most effective at improving word-reading outcomes with students in grades kindergarten through third grade. Future research on isolating specific components may be beneficial. Further, only four included studies were conducted in Tier 1. Further research should focus on whole-class phonics instruction, rather than intervention or intensive remediation, especially when teachers are using high-quality instructional resources such as those approved by the Kentucky Department of Education.

Additional instructional components that need further study include the use of technology and the alignment of Tier 1 whole group instruction with intervention in Tiers 2 and 3 that are tailored to student needs. Our findings offer preliminary evidence that this alignment may benefit students but further investigation of the ways in which this recommendation can successfully be implemented is warranted Regarding technology, every K-3 classroom across the country has technology embedded into the technology, however, only 6% of our included studies evaluated technology-based phonics instruction. Future research should further expand the present research done (i.e., Parry et al., 2024; Silverman et al., 2023), by exploring the role of technology in teaching phonics with early elementary students and the conditions under which technology may support reading outcomes.

Finally, we note that no studies included in this review offered guidance in two areas educators may wish to understand. First, we are unable to make suggestions regarding how caregivers can be leveraged to improve student phonics. We aim to address this omission in an additional review geared toward family literacy. Second, no included study targeted assessment of phonics and how educators and instructional leaders can use assessment data to guide their instructional decisions. Future research should provide clarity in this area.

Conclusion

This review employed the stages of a Systematic Literature Review and adhered to the PRISMA protocol to collect and analyze data from 65 empirical studies focused on phonics interventions or practices designed to help children in kindergarten through third grade. The findings revealed that explicit, systematic phonics instruction remains critical for improving foundational reading outcomes in early elementary students. Positive effects were most consistently observed when interventions targeted phonological and phonemic awareness, provided explicit instruction in grapheme-phoneme correspondence, and included multi-component instructional packages. Notably, the greatest number of effective interventions were implemented in Tier 2 and Tier 3 settings, with only a small proportion of studies situated in Tier 1.

Numerous instructional and intervention characteristics for phonics interventions and practices were identified. These included explicit instruction, phoneme blending and segmentation, use of manipulatives (such as Elkonin boxes), instruction in high-frequency sight words, decodable texts, opportunities for repeated practice, and a range of implementers from teachers to paraprofessionals. Other key elements included the integration of technology when individualized to student needs as well as multi-component instructional packages.

While these findings align with previous research on the science of reading, this review expands the field by documenting the diversity of approaches, student populations served (including multilingual learners and students with disabilities), and consistent benefits of explicit instruction across tiers. The review also underscores the sustained, though sometimes diminishing, benefits of intensive intervention over time.

Significant barriers regarding phonics instructional practices and interventions identified in the literature are validated by the findings of this study. The results reveal persistent obstacles related to limited teacher preparation in phonics, the continued prevalence of less effective curricular materials, and the challenge of ensuring all students—particularly those with diverse learning needs—receive appropriately intensive, explicit instruction. Curricular programs that encourage over-reliance on context rather than decoding remain a notable impediment to student progress.

Consistent with previous reviews, this research demonstrated that specialized professional development for educators is essential for effective phonics instruction. Evidence supports the use of structured training programs and ongoing coaching to build teachers' expertise in the principles and practices of explicit phonics instruction, thereby improving student reading outcomes.

Significant constraints arose from the application of the rigorous PRISMA protocol criteria, including the exclusion of potentially informative studies due to limited reporting of intervention components or lack of explicit phonics-related outcome measures. Additionally, variability in the detail and quality of study descriptions sometimes limited the depth of synthesis achievable within this review.

This review identified several limitations that underpinned the formulation of recommendations for future research. The focus on studies explicitly measuring phonics outcomes may have excluded valuable insights from broader literacy interventions. Furthermore, insufficient reporting on family and caregiver engagement, as well as the use of assessment data to guide instruction, emerged as areas needing further exploration.

Additionally, this review highlights the need for future research to address the gaps in Tier 1 instructional studies, provide more guidance on effective assessment practices, and examine strategies for leveraging family involvement to support phonics development. By continuing to refine instructional approaches and address persistent barriers, educators and researchers can better support all students in building the foundational skills necessary for lifelong reading success.

Table 1. Overview of Studies and Reported Demographics

Study	Design	Students	Who Implemented the Research	Dosage	Researcher Created Intervention Program	Name of Curriculum (if applicable)
Ahlgrim-Delzell et al. (2014)	SCD MB	2 1st grade and 2nd grade Both SWD	Tech and TI	Individual instruction Daily for 12-20 min.	Yes	GoTalk Phonics
Alber-Morgan et al. (2016)	SCD MB	3 1st grade All SWD	TI	Individual instruction 10-15 min.	Yes	
Bazis et al. (2022)	Matched Pairs and SCD MB	18 2nd grade and 15 3rd grade All AR	RI	15 min. 4 days a week	No	Word Sounds
Bouton et al. (2018)	QED comparison	24 1st grade, 4.2% SWD All AR	HI	30 min. 5 days a week	Yes	
Bradley & Noell (2017)	SCD reversal	6 1st grade All AR	RI	8 sessions	Yes	
Brimo (2016)	QED comparison	10 3rd grade All SWD (dyslexia, dysgraphia, a spelling disorder, and/or ID)	HI	25 min. 3 days a week 10 weeks total	No	

Table 1. Overview of Studies and Reported Demographics (Cont.)

Study	Design	Students	Who Implemented the Research	Dosage	Researcher Created Intervention Program	Name of Curriculum (if applicable)
Burns et al. (2020)	QED comparison	252 2nd grade and 247 3rd grade 22 SWD 92 AR	HI	_	Yes	
Burns et al. (2024)	QED comparison	323 1st grade, 33 2nd grade, and 290 3rd grade 45 ML	TI	_		
Burton et al. (2024)	RCT	90 ML	RI and Tech	35 min. sessions	Yes	
Case et al. (2014)	QED comparison	124 1st grade	HI	40 min. 1 time a week 12 weeks total	Yes	
Cassady et al. (2018)	QED comparison	767 K, and 723 1st grade All ML	Tech	20 min. 4 times a week	No	
Cheatham et al. (2014)	pre-test/post-test	62 2nd grade, 11 AR	TI	25-30 min. 1 time a day	Yes	
Contesse et al. (2021)	RD	62 total 29% 1st grade, 34% 2nd grade and 23% 3rd grade 58% SWD	HI	1 hr. a day 15 days	No	UFLI - Intensive Intervention

Table 1. Overview of Studies and Reported Demographics (Cont.)

Study	Design	Students	Who Implemented the Research	Dosage	Researcher Created Intervention Program	Name of Curriculum (if applicable)
Coyne et al. (2018)	RD	84 1st grade, 108 2nd grade, and 126 3rd grade	HI	30-40 mins. 4 days a week 1 school year	No	Proactive Early Interventions in Reading
Denton et al. (2021)	QED comparison	43 2nd grade and 3rd grade All ML All SWD (learning difference, SLI, and/or ID)	TI	_	No	Idea Detectives
Denton et al. (2014)	QED comparison	162 1st grade and 2nd grade 8% ML 30% SWD	HI	45 min. 4 days a week 23-25 weeks	No	Guided Reading and explicit instruction
Denton et al (2020)	RCT	222 2nd grade and 3rd grade 77 ADHD	HI	45 min. 4 times a week 16 weeks	No	Sound Partners & Sound Partners Plus
DuBois et al. (2014)	RCT	12 K and 18 1st grade 18 ML	HI	2 weeks	No	Tutoring Buddy Program
Dussling (2020)	SCD MB	13 K All ML	RI	30 min. 5 times a week 6 weeks	No	Road to Reading: A Program for Preventing and Remediating Reading Difficulties

Table 1. Overview of Studies and Reported Demographics (Cont.)

Study	Design	Students	Who Implemented the Research	Dosage	Researcher Created Intervention Program	Name of Curriculum (if applicable)
Dussling (2020)	SCD MB	13 1st grade All ML All AR	RI	30 min. 5 times a week 6 weeks	No	Road to Reading: A Program for Preventing and Remediating Reading Difficulties
Dyson et al. (2017)	QED comparison	56 1st grade and 28 2nd grade	HI	20 min. 2 times a week 4 weeks	Yes	
Evans et al., (2014)	Pre/Post	7 2nd grade, 8 3rd grade All AR	RI	30-60 min. A session 8 weeks 28 hours total	No	Benchmark Word Detectives Programme
Fien et al. (2015)	RCT	267 1st grade All AR	TI and Para	30 min. a day 26 weeks	No	Enhanced Core Reading Instruction
Fein et al. (2021)	RCT	352 1st grade All AR, 86 ML 19 SWD	TI and Para	90 min. (tier 1) 30 min. (tier 2)	No	Enhanced Core Reading Instruction
Foorman et al. (2017)	RCT	531 K, 534 1st grade, and 639 2nd grade All AR 560 ML	Para and HI	45 min. a day 7 months	Yes	

Table 1. Overview of Studies and Reported Demographics (Cont.)

Study	Design	Students	Who Implemented the Research	Dosage	Researcher Created Intervention Program	Name of Curriculum (if applicable)
Frates et al. (2024)	SCD MP	1 K and 1 1st grade Both ML Both SWD (ASD and SLI)	RI and TI	20 -30 min.	Yes	
Fuchs et al. (2019)	RCT	125 1st grade All AR 21 ML	RI	45 min. 3 times a week 21 weeks	Yes	
Georgiou et al. (2021)	RCT	48 3rd grade All AR 16 ML	RI	30 min. 3 times a week 10 weeks	No	The Simplicity Intervention Structured word Inquiry Intervention
Gonzalez-Frey & Ehri (2021)	RCT	72 K	RI		Yes	
Harmey & Anders (2023)	Pre-test/post-test	4049 K and 1974 1st grade 1700 ML	TI	2 years	No	Reading Recovery
Joseph (2018)	SCD MB	3 2nd grade All ASD	RI	30 min. 10-30 sessions	Yes	
Koutsouris et al. (2021)	RCT	298 2nd grade and 3rd grade	TI and Para	30 min. 4 times a week	No	Integrated Group Reading

Table 1. Overview of Studies and Reported Demographics (Cont.)

Study	Design	Students	Who Implemented the Research	Dosage	Researcher Created Intervention Program	Name of Curriculum (if applicable)
Larabee et al. (2014)	SCD	3 1st grade All AR, 2 ML 1 SWD	RI and Tech	4-19 min. 3-4 days a week 11 sessions	Yes	
Lindo et al. (2018)	RCT	1 K, 5 1st grade, 3 2nd grade, and 4 3rd grade All AR	TI	25-45 min. 2 times a week 16 weeks	Yes	
Parker et al. (2020)	SCD MP	4 1st grade All ML All AR	RI	25 min. 8-25 lessons	No	Word Construction
Park et al. (2020)	Pre-test/post-test	39 3rd grade All AR	RI	40-50 min. 2-3 times a week 10 sessions	Yes	
Partanen et al. (2018)	Longitudinal effectiveness study	158 3rd grade 82 AR 40 SWD	Para	3.75 hours a day 5 days a week 3 months	Yes	
Peterson-Brown & Burns (2019)	within-subjects group design	32 2nd grade and 9 3rd grade All AR	RI	10-15 mins. 1 time a week 4 weeks	Yes	
Pindiprolu & Marks (2020)	RCT without control	8 K, 8 1st grade, and 4 2nd grade All AR	Tech	30 mins. 5 days a week 8 weeks	No	Funnix PLATO

Table 1. Overview of Studies and Reported Demographics (Cont.)

Study	Design	Students	Who Implemented the Research	Dosage	Researcher Created Intervention Program	Name of Curriculum (if applicable)
Pomper et al. (2022)	RCT	155 1st grade 36 DLD	RI	60 min. 3 times a week	No	Fast Mapping Ostensive Naming
Pullen & Lane (2014)	RCT	98 1st grade All AR	RI	30 lessons 3-4 lessons a week 7-10 weeks	Yes	
Rahn et al. (2015)	SCD MB	2 K Both ML Both SWD	RI	10-15 mins. 4 times a week 17 weeks	Yes	
Ross & Joseph (2020)	SCD MP	5 K All SWD	RI and Tech	15 min. 4-5 times a week	No	Build a Word-Easy Spelling with Phonics
Russell & Shiffler (2019)	QED	30 1st grade 13 AR	RI	30 min. a day 4 weeks	Yes	
Savage (2020)	QED matched pairs	510 2nd grade 149 AR	RI and HI	30 mins. 3 times a week 1 semester	Yes	
Savage (2024)	RCT	63 3rd grade	RI and HI	30 mins, 3 times per week, over 10 weeks	No	
Schlesinger & Gray (2017)	SCD MB/MP and ATD	12 2nd grade 5 SWD	RI and HI	30-60 min. 1-3 times a week 6-7 weeks	Yes	Modified Orton-Gillingham

Table 1. Overview of Studies and Reported Demographics (Cont.)

Study	Design	Students	Who Implemented the Research	Dosage	Researcher Created Intervention Program	Name of Curriculum (if applicable)
Shapiro & Solity (2016)	QED comparison of two programs	799 K and 382 1st grade	TI	School year	No	Letters and Sounds Early Reading Research
Simmons (2014)	Longitudinal follow up to a RCT study	368 K for original study, all 2nd grade for follow-up 40 ML 26 SWD	TI and para	30 min. a day 5 days a week 100 lessons	No	Early Reading Intervention
Smith (2016)	RCT	811 1st grades 160 ML 60 SWD	TI	_	No	Enhanced Core Reading Instruction
Solari (2018)	RCT	98 1st grade All AR	TI	4 times a week 17 weeks	Yes	
Stocker et al. (2023)	SCD MP	2 3rd grade Both SWD	RI and HI	5-8 min. 78 sessions	Yes	
Storkel (2017)	RCT	27 K All SLI	RI and HI	20-30 min. each session 10-20 sessions 5–10 weeks 12, 24, 36, or 48 cumulative exposures	Yes	

Table 1. Overview of Studies and Reported Demographics (Cont.)

Study	Design	Students	Who implemented the research	Dosage	Researcher Created Intervention Program	Name of Curriculum (if applicable)
Wolter (2013)	RCT	20 2nd grade 11 SWD	SLP	90 min. a day for 9 days	Yes	
Vadasy & Sanders (2021a)	RCT	68 K All AR 12 ML	RI and HI	20 min. sessions	Yes	
Vadasy & Saunders (2021b)	RCT	34 K and 31 1st grade 31 ML 31 AR	RI and HI	20 min. sessions 4 days a week 5 weeks	Yes	
Vadasy & Sanders (2023)	RCT	57 K All AR 26 ML	RI and HI	20 min. sessions 4 times a week, 6 weeks	Yes	
Vadasy et al., (2023)	RCT	125 K All AR 38 ML 9 SWD	RI and HI	20 min. sessions 15-24 days	Yes	
Vanderwood et al., (2014)	QED	12 1st grade All ML All AR	Para	30 min. sessions 5 days a week 11 weeks	Yes	
Vousden et al., (2022)	RCT	1,424 K and 1st grade 735 AR	Tech and Para	15 min. a session 4 times a week 20 weeks	Yes	

Table 1. Overview of Studies and Reported Demographics (Cont.)

Study	Design	Students	Who Implemented the Research	Dosage	Researcher Created Intervention Program	Name of Curriculum (if applicable)
Winn et al., (2020)	QED	42 ages 5-8 All AR	Tech	2 6-week periods	No	ReadingDoctor
Wook Ok et al., (2021)	SCD, MP	3 1st grade All AR	Tech	20 min. sessions 4 days a week 5 weeks	Yes	
Young et al., (2019)	QED	76 2nd grade 8 ML 2 SPED 15 AR	GE	18 weeks	Yes	
Zipke (2016)	Pre/Post with Randomize	23 1st grade, 7 2nd grade	RI	20-25 min. lessons 5 lessons	Yes	
Zugel (2020)	QED	88 1st grade 22 ML	GE	45 min. a day 11 weeks	No	Words Their Way

Note. - = information was not reported; ADHD = attention deficit hyperactivity disorder; AR = at-risk; ASD = autism spectrum disorder; ATD = alternating treatment design; DLD = developmental learning disability; DRI = differential reading instruction; GE = general education teacher; HI = hired professional implemented; ID = intellectual disability; IRA= interactive read-alouds; K= kindergarten; MB = multiple baseline; min = minutes; ML = multilingual; MP = multiple probe; Para = paraprofessional; QED = quasi-experimental design; RCT = randomized control trial; RD = regression discontinuity; RI = researcher implemented; SCD = single-case design; SLI = specific language impairment; SLP = speech and language pathologist; SWD = students with disabilities; tech= technology implemented; TI = teacher implemented

Table 2. Component Analysis

Table 3. Tired Supports

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