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ORIGINAL PAPER

On the Science of Reading: How Social Justice, Behavior Analysis, and Literacy Instruction Converge

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Abstract

The main responsibility of our educational institutions is to develop competent readers and thus, a literate citizenry. Indeed, literacy is requisite to access valued opportunities our society offers, which leads to a worthwhile quality of life. Unfortunately, our educational institutions persist in a stalemate on how best to effect reading competence in our children. This impasse has left generations of children and adults behind. The literacy deficits resultant from these "reading wars" are magnified and exacerbated by other confounding factors such as increasing levels of poverty, social and economic inequalities, the COVID-19 pandemic, and more. Recently published reading data of fourth graders in the United States exhibit some of the most disparate performances to date, especially when contextualized by race or ethnicity. More and more, educational and political leaders are calling for the return to systematic and explicit phonics instruction, which has been empirically shown to improve reading ability. When taken together, it is clear that providing demonstrably effective reading instruction for children and youth with social and economic vulnerabilities is more than a political debate; it is an issue of social justice. The authors of this article illustrate how the foundations of behavioral principles can inform reading instructional practices that will bolster our fledgling literacy rates and ultimately frame what it means to provide socially just literacy education for all.

Keywords Literacy · Reading · Social justice · Instruction · Science of Reading

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For years, we have recorded patterns of demographics and literacy rates in the U.S. schools. The recent decline in student performance gives cause for concern and urgent reform. According to the Nation's 2022 report card (NAEP, 2023), recent reading achievement levels have steadily decreased since 2019. NAEP reading achievement levels are divided into categories of, "basic, proficient, and advanced." Each of these levels presents expectations for student performance based on the type of text, difficulty level, and cognitive processes involved. The baseline reading goal for students is to reach a level of proficiency which indicates solid academic performance and competency of reading materials. However, according to this 2022 report, only 33% of all fourth-grade students are considered to be proficient readers when compared to 35% of students in 2019. Even more concerning, nearly 63% percent of fourth- grade students are performing at the lowest, or most basic reading level. This basic reading level indicates that students only have a surface-level understanding of the text they are reading, and struggle with inferences, and making deeper connections to their own experiences. Results are even more discouraging when disaggregating data by student subgroups who historically have demonstrated the greatest need. The following data highlight the current percentage of fourth- grade students who read at a proficient level according to race/ethnicity: Asian (58%), Asian/Pacific Islander (56%), White (42%), two or more races (38%), Native Hawaiian (23%), Hispanic (21%), American Indian/Alaska Native (18%), Black (17%). Students considered to read at a basic level display the following breakdown: Asian (25%), Asian/Pacific Islander (25%), White (31%), two or more races (30%), Native Hawaiian (28%), Hispanic (29%), American Indian/Alaska Native (25%), Black (27%). Finally, students reading at an advanced level based on race/ethnicity are broken down as follows: Asian (24%), Asian/Pacific Islander (23%), White (11%), two or more races (11%), Native Hawaiian (6%), Hispanic (4%), American Indian/Alaska Native (3%), Black (3%). Students not represented under one of these three categories reflect scores falling below the NAEP basic level. These data show that many students continue to struggle in reading, particularly those from Black, Hispanic, and Indigenous populations. Evidence-based, intensive interventions are warranted for all children, especially those populations that are less successful, which necessitates a firm understanding of the science of reading.

The Science of Reading

Learning to read is the most important academic skill our society can give its children. Recognizing the relatively poor reading scores of our students, which have declined further following the COVID-19 pandemic, educators, researchers, and other stakeholders are giving more attention to the *science of reading* and the implications for more effective instruction. What is the science of reading? Shanahan (2020) believes that many who refer to the science of reading mean only phonics, but other sources point out that the science of reading means much more, reflecting decades of study, debate, and analysis (Dewitz & Graves, 2021; Semingson & Kerns, 2021). According to Dewitz and Graves (2021), the science of reading includes a systematic

approach to phonemic awareness, phonics, and fluency, and teaching vocabulary and comprehension as well as attention to ways to engage students in the reading process.

Semingson and Kerns (2021) review the pioneering work of Jeanne Chall (1967) and point out that Chall emphasized that children needed phonics instruction along with instruction involving children's literature. Somewhat aligned is the simple view of reading (SVR) model, which contends that the science of reading is essentially the ability to decode words (i.e., word recognition) and linguistic comprehension (i.e., understanding language and sentence structure) (Gough & Tunmer, 1986; Hoover & Gough, 1990). That is, skilled reading is contingent upon the ability to decode words and to comprehend language. Further, skills such as decoding need to be taught explicitly to produce reading competence, which does not emerge coincidentally with exposure to quality literature alone. Duke and Cartwright (2021) acknowledge the importance of the SVR but elaborated on it by (1) adding a third dimension of active self-regulation; (2) further extending the existing components of decoding and linguistic comprehension; and (3) arguing that decoding and comprehension are not discrete, but extensively overlapping functions. For example, vocabulary, reading fluency, and morphological awareness all relate to decoding and language comprehension. Duke and Cartwright refer to their model as the active view of reading (AVR) with three components of word recognition, language comprehension, and active self-regulation. A particularly unique feature of AVR compared to SVR is the importance of motivation and engagement, executive functioning skills, and reading strategies within the dimension of active self-regulation. AVR also emphasizes cultural and reading-specific background knowledge within language comprehension.

As the field evolved in its understanding of reading instruction from a simple view of reading to a more active view of reading, another helpful explanation that emerged was Scarborough's (2001) Rope Model of Reading. The Rope Model of Reading suggests that reading consists of two sets of strands: word recognition (phonics, decoding, sight recognition) and language comprehension (background knowledge, vocabulary, etc.). This rope represents a powerful visual on how both strands are necessary (i.e., woven together) for proficient reading (Scarborough, 2001). Although it is positive that the field continues to progress in its explanation of the roles these important skills play in the complex behavior of reading, it is noteworthy that despite structural differences, decoding and language comprehension remain central functions and some models are yet to be tested as a whole in applied settings (Duke & Cartwright, 2021). Nevertheless, we know that good reading instruction demands solid, robust instruction in all the components of reading including phonological awareness and decoding.

The National Reading Panel (2000) systematically and critically analyzed reading research and recommended best practices to ensure all children in U.S. schools would have access to high quality literacy instruction. This heavily referenced authority identified key reading components of phonemic awareness (ability to identify the smallest unit of sound), phonics (ability to equate sound–symbol correspondence), fluency (ability to read quickly and accurately), vocabulary (word meaning), and comprehension (ability to understand meaning of written text). The panel recommended phonological components (phonemic awareness and phonics) as foundational for beginning reading along with instruction in fluency, vocabulary,

and comprehension. The science of reading, previously referred to in terms such as best practice, research-based, and evidenced-based (Dewitz & Graves, 2021), can be viewed as the body of knowledge that directs how we teach reading.

At present, there are several school-based approaches to teaching reading, but the most recognized ones have contrasting features (Gabriel, 2020), centering either on (1) systematic phonics instruction and/or (2) word meaning and literature instruction for early reading. The former is aligned with behavioral science where researchers propose that beginning readers need to distinguish basic sounds, associate these sounds with their graphic representations and then move on to fluency in auditory and visual symbols. These steps along with instruction in vocabulary development and comprehension facilitate reading competence. To be effective all instruction needs to be explicit, systematic, and sequential. The second approach is mainly the learning of words and the reading of literature. Although curricula are provided, they are loosely structured and place more emphasis on the learners' interest in the material. "Whole Language" is often the term applied to this latter approach, whereas "Balanced Literacy" is a more recent term, which may be characterized as a Whole Language approach with inclusion of some phonics instruction. Reading authorities generally agree that approximately 30% of all children will learn to read regardless of approach; however, about one half will require systematic and explicit instruction, and the remaining 20% will need additional, possibly specialized, supports (Ciresi Walburn Foundation, 2023; Educational Advisory Board [EAB], 2023; Lyon, 2015). There is an urgency to understand why the U.S. schools are failing such a large segment of its students by not providing the level of systematic and explicit instruction needed to read proficiently.

The position of phonics as foundational to effective reading is based on extensive research reviews (e.g., Fletcher et al., 2021; NRP, 2000; Roberts et al., 2022) but is not universally embraced. Bowers (2020), for example, seriously questions the research community's view that early reading should include systematic phonics instruction. Along with questioning the rigor and validity of much of the existing research, Bowers also is at odds with practices he associates with systematic phonics instructions. He suggests, for example, that systematic phonics instruction ". . . explicitly teaches children grapheme–phoneme correspondences prior to emphasizing the meanings of written words in text. . ." (Bowers, 2020, p. 683). An alternative to systematic phonics instruction, according to Bowers, is Whole Language, which focuses on word meaning within texts. Balanced Literacy a hybrid that combines Whole Language with phonics is an approach Bowers considers a more viable alternative to systematic phonics in early reading. Bowers contends there are no advantages of systematic phonics over unsystematic phonics. He concludes that phonics may be important but finds the empirical evidence of systematic phonics instruction over other approaches is lacking.

In their response to Bowers (2020), Fletcher et al. (2021) disagreed with Bowers's basic positions and asserted that there is valid research evidence favoring systematic phonics instruction for early reading and there is no evidence that systematic phonics instruction ". . . requires eschewing real books" or excluding other parts of language learning such as morphology (p. 1270). Although Fletcher et al. did acknowledge research gaps and a need for more intense study of some components

(e.g., morphology), they nevertheless endorsed the general professional consensus of the critical importance of systematic phonics to beginning reading.

Social Justice and Reading

The failure to implement research-based reading instruction, which heavily relies on systematic phonics instruction in early literacy practices, undoubtedly contributes to struggling readers and societal inequalities, disproportionately affecting minority and low socioeconomic families lacking resources to counterbalance inadequate classroom instruction (Terry, 2021).

Furthermore, children who are struggling readers often face negative consequences throughout their lives that start with academic struggles during their schooling. These children are more likely to be identified for special education services, at greater risk of dropping out of school, and often limited to low-paying career options as adults (Gardner et al., 2014; Heward & Twyman, 2021). The correlation between grade-level reading difficulties and subsequent future interactions with the criminal justice systems are documented in the literature (Simonton, 2016). These negative results disproportionately affect minority children prohibiting many of them from experiencing the American Dream of equal opportunities. If schools are to assume their role as a catalyst for moving the country toward a more equitable society, educators must become effective in teaching reading skills to maximize the opportunities for all children. It is time that we view literacy instruction with an emphasis on racial equity and social justice.

In this article we contend that sound behavioral principles' application to reading instruction can support the selection and implementation of evidence-based reading practices to provide efficacious literacy instruction for marginalized populations, and that this is an issue of social justice for America's youth. We do not deny the importance of good literature and related literary experiences as fundamental to the reading process. In fact, we embrace quality literature, especially literature that reflects the learner's background, which conceivably would enhance the reading experience. We do, however, seriously question any approach that rules out or minimizes the skillful instruction of foundational skills, including phonics, for the beginning or struggling reader.

Science of Reading from a Behavior Analytic Perspective

As discussed thus far in this article, the act of reading is far more than decoding words alone. It involves a complex tapestry of symbiotic skills within the context of background knowledge and vocabulary that ultimately leads to high levels of comprehension. When comprehension, vocabulary, background knowledge, and high-interest literature are combined with clear and systematic instruction in foundational prerequisite skills, an effective reader emerges. There is more than enough evidence to show that structured literacy programs with scripted curricula results in this type of positive reading performance (NRP, 2000). Part of the success of scripted

curricula may be due to components such as a tightly sequenced instructional scope, errorless learning techniques, immediate and specific feedback, and reinforcement. These characteristics are drawn from the conceptual base of behavioral sciences and therefore, the synthesis of behavioral principles with the science of reading may help to foster improved teaching technologies and reading outcomes for our most vulnerable students.

In their seminal article published in 1968, Baer et al. identified the guiding characteristics of applied behavior analysis as being *applied, behavioral, analytic, technological, conceptually systematic, effective, and able to produce generalized outcomes.* Because learning to read, the teaching of reading, and the selection of effective reading curricula all qualify as *behavior,* these variables fall under the domain of interest in applied behavior analysis and are therefore appropriately viewed according to these characteristics. The application of these characteristics to the discussion of reading behavior and instruction follows.

According to Cooper et al. (2020), the *applied* dimension of applied behavior analysis indicates that the behaviors selected for change or instruction should be those that are socially significant to the individual and will improve the daily experiences and affect other significant individuals in their life. The nature of reading being a cusp behavior (yielding access to new learning opportunities) in the repertoire of any individual living in modern society qualifies as one of the most applied behaviors that can be taught. One need not look far in the immediate environment to locate textual information. In fact, a report from the University of California-San Diego suggests that Americans may consume an average of approximately 100,000 words daily (Bohn & Short, 2009). It is clear that the comprehension of written text that is pervasive in our environment is an integrated part of daily life and the often-repeated phrase, "reading is fundamental" belies the applied nature of reading to all other skills and knowledge one may attain across the lifespan. Next, reading meets the *behavioral* characteristic of applied behavior analysis because reading behavior meets three requirements of this component: first, it is the actual behavior and not a proxy. For example, decoding letters within words while producing the correct corresponding sounds and words would universally be judged accurately as "reading."

Second, reading can be measured reliably as it is certainly able to be determined if a word is read correctly or incorrectly by an independent observer. This criterion is evident when teachers analyze their students' oral reading fluency through progress monitoring probes or oral read aloud activities in class. Finally, when changes in the behavior are observed, it is the individual's behavior that is altered, rather than perceptions of observers. Therefore, textual oral reading satisfies all elements of the behavioral criterion. The reading research that has soundly contributed to the base of the science of reading is demonstrably *analytic.* The research base is replete with demonstrations of functional relations between explicit and systematic instruction in phonics and the resulting ability of individuals to read (Ainsworth et al., 2016; Allor et al., 2010; Bradley & Noell, 2018; Finnegan, 2012). In a school-based context, we observe the analytic nature of reading instruction when educators work within a multitiered systems of support (MTSS) model. In MTSS models (otherwise referred to as a Responsiveness to Intervention model; RTI), teachers make instructional decisions based on benchmark or progress monitoring data. Relying on specific

data allows targeted reading intervention to serve the greatest capacity of learners in effective ways that make the most of crucial instructional support resources. The analytic dimension of behavior analysis is evident in controlled demonstrations such as research reports, MTSS, and formative and summative classroom assessments. But it is also evident when parents begin reading to their children and evaluate their child's response to tracking printed text with one's finger because the parent is making the relation between spoken words and printed text salient for the child. In any demonstration, from the parent guiding the young child's joint attention to the broad scale meta-analyses of reading research, the analytic dimension of applied behavior analysis is concerned with looking for relations between x (reading instructional behavior) and y (learned reading behavior). The nature of demonstrably effective instruction in reading is inherently *technological*. According to this feature, the procedures of the studies that have contributed to the science of reading base as well as the subsequently recommended practices for teaching (e.g., explicit and systematic instruction) require that all operative steps are described in sufficient detail for replication. In fact, a scripted curriculum such as Direct Instruction exemplifies this criterion very well. Technically sound curricula such as Direct Instruction provide a step-by-step explicit sequence for instructional delivery that ensures replicability of both delivery and ultimately, repeatable effects on students' reading behavior.

Another example is how a teacher might use very technological, stepwise procedures to teach students how to "cite evidence in text," a crucial skill for extracting meaning and applying that meaning to other targets. For example, the RACE strategy for responding to literature directs students to: Restate, Answer, Cite evidence, and Explain the response (Nicols, 2013). Learning a stepwise strategy such as this may improve the likelihood that the outcomes are maintained and replicable across settings and new environments. Next, effective reading instruction is *conceptually systematic* because it adheres to the known developmental principles of learning that include acquisition of the necessary prerequisite skills (phonemic awareness, phonics, and vocabulary) to produce the later changes in behavior that are ideal outcomes of the reading process (making meaning from text or comprehension, which may be likened to the generalization or adaptation stages of learning). Researchers and other field experts from varied disciplines may fashion theories and explanations of the reading process in different terms, but often there is convergence of conceptual systems that underlie the explanations. For example, a behavioral psychologist's approach to reading instruction may rely heavily on sequential and discrete skill acquisition advancing to making meaning or comprehension, whereas a teacher with more background in cognitive or developmental psychology may use terminology representative of that lexicon to explain the same process. We contend that, although seemingly at odds, these theoretical paradigms are actually conceptually systematic in that they converge to a unified understanding that effective reading requires *all* components of the process that develop in a sequential fashion. In other words, to facilitate effective reading, a sound development sequence of skill acquisition must be followed and those prerequisites and developmental sequences are woven together in an integrated fashion (e.g., the Reading Rope) to create a skilled reader.

The *effective* dimension of applied behavior analysis states that the behavior under study must be improved to a practical degree. The use of systematic and explicit

phonics instruction produces substantial changes in reading skill and the improved reading ability yields subsequently improved comprehension. The ability to "read on grade level" (or meet any objective benchmark of reading skill) will require the application of phonics knowledge to correctly produce words and comprehend text. On the other hand, we may observe that the counter of this application—not providing systematic and explicit phonics instruction in early literacy practices—reliably produces a pattern of reading failure for children.

It is also important to note that when we rely on single-case designs to evaluate reading intervention protocols, we can more easily ascertain the magnitude of change to an individual's reading behavior. The act of reading occurs at the individual level; therefore, it is useful for a teacher to confer with the research that demonstrates how any specific instructional practice affects the reading behavior of individual students. That is, we can see how effective an instructional practice is by the unit of analysis most appropriate to the behavior (i.e., the individual level). Single-case design research is most suited to the analysis of the effective dimension of applied behavior analysis whereas larger scale group-design research demonstrations of an already individually analyzed instructional practice may serve to enhance the external validity and generality of practices that are known to be effective for individuals. According to Cooper et al. (2020) "a behavior change has *generality* if it lasts over time, appears in environments other than the one in which the intervention that initially produced it was implemented, and/or spreads to other behaviors not directly treated by the intervention" (p. 18). As a rule, reading is a learned behavior with durable and irreversible effects. That is, barring some intervening event such as brain injury or biological anomaly, once learned, reading is a behavior that persists throughout the lifespan. Further, by definition, systematic and explicit instruction in phonics allows one to decode other limitless words without direct training. This is not true for whole word reading approaches such as Whole Language.

That is, in Whole Language methods words are the unit of analysis, not letter sounds. Therefore, each word is an ungeneralizable unit because individual letters (that comprise the repertoire of printed language) are arranged in new and unique sequences that generate new words. In summary, systematic, and explicit instruction in phonics may be considered an intervention that adheres to all characteristics of applied behavior analysis and has contributed a breadth of empirical support to the science of reading knowledge base. We see evidence of many of these dimensions of behavior in known effective instructional practices for reading.

Applying Behavior Analytic Principles to Reading Instruction

There is a substantial body of research that demonstrates how children learn to read and that the vast majority of children can be taught to read (Moats, 2020). This evidence is moving researchers, policy makers, and practitioners away from the traditional debates on how children learn to read (Castles et al., 2018) to now focus on how we teach reading (Moats, 2023; Seidenberg et al., 2020). Because reading instruction focuses on assessed reading proficiency, the authors note that applied

behavior analysis has decades of research focused on systematic applications to the science of behavior and behavior change (i.e., instruction) that are reliable and replicable (Greer, 2002). Direct instruction, teaching prerequisite skills, and creating an environment that supports positive reinforcement are evident illustrations of the behavioral analytic approaches used in reading instruction.

Direct Instruction

Direct instruction has a rich history of supporting learners with and without disabilities (Hughes et al., 2017). This instructional approach involves the teacher leading the learning process through clear and explicit teaching of specific skills and concepts. These strategies inherently reflect the behavioral and technological characteristics of applied behavior analysis and include explicit explanations, modeling/demonstration, and guided practice (Archer & Hughes, 2010; Rupley et al., 2009). To help learners, especially young learners, become proficient readers, this approach should be integrated into teaching phonemic awareness, phonological awareness, fluency, vocabulary and comprehension (NRP, 2000) and across content areas (Vaughn, 2023). Direct instruction provides a structured and organized learning environment that helps students to learn more efficiently. Direct instruction typically involves a clear and systematic sequence of instruction, with each lesson building upon the previous one. Sequential instruction allows learners to experience success as they learn new skills, increasing their confidence and willingness to participate. If students make an error, they receive immediate corrective feedback ending with the students making the correct response. This minimizes students' opportunity to practice errors making the learning process more efficient.

This conceptually systematic approach helps students to correctly navigate the relationship between concepts and skills, making connections between currently mastered skills and new skills. A hallmark of direct instruction is errorless learning. That is, instruction that carefully sequences the development of skills so that the student has a high likelihood of responding correctly to the instructional stimuli. If student error does occur, immediate corrective feedback is implemented. Moreover, direct instruction typically involves frequent review and assessment, which helps to reinforce learning and allows teachers to identify areas where students may need additional support. Although direct instruction involves the teacher leading the learning process, it also promotes active student responding, which reflects the behavioral dimension of applied behavior analysis. For example, direct instruction may involve guided practice, where students work in small groups or pairs to apply new skills and strategies. Active participation strategies promote student engagement in the learning process, providing opportunities for them to practice and for teachers to observe whether the student is accurately employing the new skills. In addition to direct instruction, teaching prerequisite skills to fluency is crucial for success in reading (Johnson & Street, 2004). By building a strong foundation of essential literacy skills, students are better equipped to read and comprehend more advanced reading tasks as they progress in school.

Teaching Prerequisite Skills

The development of fluent reading is dependent on the mastery of prerequisite reading skills (e.g., phonological skills). Educators must first acknowledge and understand these skills before they can teach them (Moats, 2023). To be conceptually systematic in their approaches, educators must have an understanding of prerequisite reading skills to effectively inform instructional practices. For instance, if a student lacks phonological awareness, their oral reading accuracy and fluency could be deficient. The educator should target phonological awareness skills first to increase accuracy (decreasing the potential to practice errors) prior to implementing a reading fluency intervention. The development of these prerequisite skills addresses the generality principle in applied behavior analysis by promoting reading accuracy and fluency, which are important for vocabulary development and reading comprehension. By identifying and addressing the prerequisite reading skills that their students lack, educators increase the likelihood that students will be able to generalize foundational reading skills to increasingly complex words and material, thus opening new repertoires of behavior.

Vocabulary and Reading Comprehension

In contrast to the prerequisite behaviors required to decode text, vocabulary and comprehension represent behaviors that are more difficult to reliably measure (Vaughn, 2023). In addition, there is a greater emphasis on generality to novel, untaught skills. The goal of reading instruction is the development of students' vocabularies and their ability to comprehend written communication. Although these skills are the ultimate goals of reading instruction, both should be included as components of reading instruction from the beginning. Even when reading to young children, teachers should highlight new words to assist students in growing their vocabularies. Likewise, teachers should pause periodically when reading and ask children questions about what they heard and what might happen in the story next.

Vocabulary instruction should involve explicit definitions of new words and numerous opportunities for the students to practice the new word (e.g., 7–10 opportunities) with additional opportunities in subsequent days. Vocabulary knowledge is crucial because it enables readers to understand the meaning of words encountered in texts, enhancing their understanding of the text. Research has shown that learners with a strong vocabulary are more successful in reading comprehension than those with a limited vocabulary (Laufer & Aviad-Levitzky, 2017).

Reading comprehension and the strategies used to teach it reflect the applied dimension of applied behavior analysis well because the purpose of reading is to understand or comprehend the material, which is of immediate import to individuals in our society. Reading comprehension uses cognitive and metacognitive skills that enable readers to interact with the text, monitor their understanding, and apply strategies to clarify and construct meaning from the text. These strategies include prediction, visualization, questioning, summarizing, and making connections (Elleman & Oslund, 2019). By teaching vocabulary and comprehension strategies, educators can support learners in developing their abilities to extract meaning from written

text and engage in higher- order thinking skills such as critical analysis and evaluation. Teachers should ask both fact and inferential questions at all levels of student reading instruction. If students do not immediately respond correctly to the teacher's question the teacher can reread (or have the students reread) the section of the narrative that best reveals the best answer to the question. This strategy is especially helpful when teaching students inferential skills. Explicitly teaching vocabulary and reading comprehension from the beginning of reading instruction allows teachers to better monitor the development of students' vocabularies and reading comprehension. Teachers can then determine if additional support is needed to assist students in these two critical literacy skills.

Positive Reinforcement in the Environment

Providing behavior-specific praise of prerequisite reading skills can also keep students motivated (Royer et al., 2019) and support a positive classroom culture. Students who struggle with reading may feel discouraged and become disengaged if they do not see progress in their reading abilities. Educators can help to combat this by providing specific and meaningful praise for the prerequisite reading skills that students demonstrate. For example, if students have improved their phonics skills, an educator could praise them for their ability to decode new words. This praise provides students with positive feedback and reinforces the importance of the prerequisite reading skills that they are mastering. Creating an environment that supports positive reinforcement is an essential component of effective literacy instruction (Greer, 2002) and helps shape reading behavior in ways to achieve literacy. By fostering a classroom culture where students experience success and receive positive reinforcement for their efforts, educators can help build students' motivation and self-efficacy in reading. This is particularly important for students from marginalized backgrounds, because they may face additional challenges and barriers to success in reading. Students who receive positive reinforcement for certain behaviors are more likely to engage in those behaviors in the future (Cooper et al., 2020). Educators can provide positive reinforcement by giving specific and meaningful feedback to students. Instead of providing general praise such as "good job," educators can provide specific feedback that highlights the reading skills or strategies that the student has demonstrated. For example, an educator could praise a student for using context clues to infer the meaning of a word or for decoding a difficult word accurately. Specific feedback reinforces the importance of the reading skills and strategies that the student is using and can increase the likelihood that those skills and strategies will be used in the future. Positive reinforcement can improve classroom behavior and reduce disruptive behaviors. When students receive positive feedback for desired behaviors, they are more likely to engage in those behaviors in the future. This can lead to improved classroom behavior and a more positive classroom environment. When students receive positive feedback for prosocial behaviors such as cooperation and empathy, they are more likely to engage in those behaviors in the future. Finally, positive reinforcement can improve teacher–student relationships. When educators provide positive feedback and rewards for desired behaviors, students are more likely to feel supported and valued. This can lead to improved

teacher–student relationships and a more positive classroom climate. The socially significant nature of positive teacher–student relationships would be considered germane to the applied dimension of applied behavior analysis because they promote academic achievement, social-emotional development, and overall well-being, which are all meaningful to the individual.

Research supports direct instruction, teaching prerequisite skills, and positive reinforcement as essential components of effective literacy instruction and as practitioners become more knowledgeable and skilled with applications of the science of reading, commercial instructional programs that incorporate these practices (e.g., LETRS and REWARDS) may become more commonplace throughout our schools. Using practices founded in behavioral principles in alignment with the science of reading serve to advance the objective of providing socially just education to all students. Practitioners need to be well trained to select valid instructional materials adhering to these principles and the science of reading.

In Pursuit of Socially Just Reading Practices

Paradigmatic shifts that leave behind comfortable and familiar, but less effective, instructional practices to embrace more systematic instruction founded on the science of reading and behavioral principles is often a contentious endeavor for school districts. This was the topic of a highly publicized article by Belinda Luscombe in (2022), which succinctly illustrated the literacy curricula conflict we see similarly playing out in cities around the country. Kareem Weaver, a teacher with Oakland Unified School District (OUSD), spoke about the cycle of failure he observed in his own district. The failure not only refers to the students' reading scores, but also the failure of the district and teachers to implement and maintain effective curricula. According to Weaver, for years OUSD was using an explicit, structured phonics-based curriculum and were seeing gains. He noted that OUSD was the fastest gaining district in California for seven years in a row. And notably, he deadpans, "we hated it." Why did administrators and teachers hate it? A common refrain emerged: Explicit phonic-based curricula left teachers feeling robotic. Weaver goes on to say, "So we fought tooth and nail as a teacher group to throw that out." In 2015, they replaced that effective, structured literacy curriculum with Balanced Literacy practices that emphasized more, "rich literacy experiences" (in other words, a less phonics-based approach). Teachers' reactions to their former phonics-based structured curriculum are exemplified with statements such as, "[it] seems dehumanizing, this is colonizing, this is the man telling us what to do." And it is ironic, but "those who wanted to fight for social justice, they figured that [replacing the structured curriculum with less explicit instruction] was the new progressive way of teaching reading" (p. 63). Unfortunately, OUSD (like many other large districts in our country) serves as a cautionary tale of what can happen when we allow "feelings" instead of data to guide our decision making—even with the most altruistic intentions. Somehow, the logic spun that replacing a demonstrably effective, but structured curriculum with a less explicit curriculum, was the more socially just action to take. When, as Weaver notes, "we abandoned what worked because we didn't like how it felt to us as adults,

when actually the social-justice thing to do is to teach them explicitly how to read" (p. 64). An organized effort from community and parent advocacy groups demanded that the district reinstitute an effective curriculum. Fortunately, in 2021, OUSD moved away from Balanced Literacy and back to a structured literacy curriculum that includes an explicit phonics program with decodable texts.

Oakland Unified School District is by no means unique in its struggle to improve students' reading outcomes amid competing ideologies and polarized political and emotional pleas to school and community leaders. At this point, the pattern is tragically predictable (Barshay et al., 2021; Green & Goldstein, 2019) and the pattern is as follows. Large, urban districts with high enrollments of marginalized populations are failing to achieve reading proficiency. The local or national news highlights these failures with sensationalized quotes and dire warnings to the public regarding the effects of an undereducated or lesser literate population (Fensterwald, 2022; Hill, 2023; Papst, 2022). Published rebuttals point out that the debate around effective reading instruction has been settled and districts are choosing not to adopt curricula that emphasize these instructional features (DiMarco, 2022; Schwartz, 2022; Sohn, 2020). Following the publicity, intervening (although also well-founded) rationales are proposed for failure rates, which include things such as pandemic-related learning loss, technology deficits, hunger, lack of access to books, technology deserts, and more; all while ignoring the most direct and relevant piece of information (Keaton, 2022; O'Brien, 2022): *How* are children in these districts being taught to read? Are we universally implementing phonics-based curricula that we know are effective?

The short answer is no; we are not universally implementing phonics-based reading curricula across the nation. And in response, over the last decade as many as 30 states have passed laws related to implementation of evidence-based reading practices and the science of reading, which prioritizes explicit and systematic phonics instruction. Although more and more states slowly climbed aboard, one of the pioneers in this effort was Mississippi, which initiated curricular changes as far back as 2013 and saw subsequent improvements in literacy – moving from nearly the lowest achievement ranking (49^{th}) in 2013 to 29^{th} in literacy achievement by 2019. Although the number of states that have sought to model Mississippi's success by passing similar legislation related to the science of reading is encouraging, some contend that passing the laws is the easiest part. The difficulty lies in implementation. Indeed, according to Lisa Coons, the chief of standards and materials at the Tennessee Department of Education, "It's not something I can put on a one pager and go shop to different states and say, 'Do this. It's magic'" (Schwartz, 2022, p. 20). In fact, according to a recent survey conducted by *Education Week*, 93% of education professional respondents indicated they or teachers they supervise had participated in some professional development training in reading within the past 5 years. Although encouraging, that does not necessarily mean that the professional development activities were solely around the science of reading, nor does it translate to applying more evidence-based practices in the classroom. Unfortunately, that same survey illuminated that 61% of teacher respondents stated that they still retain some level of Balanced Literacy practices such as three cuing, which discourages children's use of phonics-based letter sound knowledge to identify words and instead directs them to make guesses

about words using picture cues and context clues (i.e., the antithesis of the application of decoding skills to word reading). As Nell Duke, professor of early literacy development at the University of Michigan, states, "We do know curriculum makes a difference" (p. 20) but the curriculum a school ends up with and how they define "science of reading" and its applications may vary. As a silver lining to the dismal effects of the pandemic on schools and student achievement, the federal allocations of increased funding to schools has yielded an opportunity to support the new initiatives toward more systematic phonics instruction. It is notable that 12 of the 26 states surveyed said that they intend to use federal monies for training new literacy curricula indicated and that some of the funds will be used for LETRS training, which is a commercial curriculum more soundly situated within the science of reading. With continued sustained effort, we have reason to be encouraged that the current direction of reading initiatives may yield better outcomes for students, even if the directional shifts are slow going and incremental.

Conclusion and Recommendations

The road to securing sound literacy curricula in American schools has proven arduous and fraught with contentious and politicized ideological debates. And the reading program selected by a school district is largely dependent on the pedagogical ideologies—the preferences—of the reading specialist or the administrator responsible for making the decision. Unfortunately, caught between these "reading wars" (i.e., opposing ideologies favoring less systematic instruction using Whole Language approaches versus more explicit and systematic direct instruction in phonics), students who need a systematic and explicit approach to reading instruction receive something that is less than what they need to catch up to grade level reading. Furthermore, the effects of providing ineffective literacy instruction to students from historically marginalized populations is exponentially magnified. We know that, at minimum, explicit and systematic phonics instruction is a basic requirement for effective reading to develop. But it is important to point out that our most vulnerable students will not only need effective instruction but also highly trained practitioners to deliver that instruction. And because districts serving more marginalized populations will see an increased number of students needing intensive remediation, these schools should have more specialists on staff to accommodate these students. In ideal circumstances, if a school serving mainly proficient readers requires a specified number of interventionists and trained reading specialists, then schools that have disproportionately more marginalized and minority students will need an increased number of highly trained professionals and those professionals will need to be more skilled than their colleagues. Unlike many of their affluent peers, marginalized students often do not have access to additional outside resources such as private tutoring to counteract ineffective school instruction.

Even though we have moved away from the immersive, Whole Language methods of reading instruction, which were prevalent in classrooms through the 1980s into the early 1990s, a shift toward the opposite end of the reading spectrum that includes explicit phonics instruction has proven to be rather stubborn. Although it

is empirically supported, a whole-hearted embrace of full, systematic and explicit phonics in early literacy instruction has not materialized. Instead, we see individual districts reluctantly conceding to the abundant evidence that convincingly settles the debate: phonics instruction is necessary to teach children how to read. The initial departure from Whole Language introduced and popularized the idea of "Balanced Literacy," which can be described as Whole Language instruction with a measured amount of phonics. Now, after years of Balanced Literacy in place and continued inadequate progress, we finally see districts moving the needle ever slightly further with the introduction of "structured literacy," which emphasizes even more explicit and systematic teaching strategies and includes foundational decoding and spelling skills as well as higher order comprehension and vocabulary work. The frustrating oscillation between the ends of the pedagogical spectrum has left students, families, and communities hanging in the balance as we are spectators of failure and point to many contributing variables that we may not be able to control (e.g., COVID-19 pandemic, poverty, hunger), while ignoring the most accessible variables, the literacy curriculum and teachers' skill. Like James Carville's infamous quip during the 1992 presidential election season, "It's the economy, stupid," we might aptly summarize this moment in the literacy crisis as, "It's the curriculum, stupid."

Related to this, it is important to note that many teachers' preservice and inservice training may have only included Whole language or Balanced Literacy curricula, which does not equip them with the skills required for systematic phonics instruction. Therefore, teachers who have been trained in Whole Language or Balanced Literacy may be reluctant to commit to explicit and systematic phonological instruction, even if the data show it is more effective for student learning. Providing instruction and extensive professional support in explicit and systematic phonological instruction for these teachers is essential if they are to successfully transition to explicit phonics instruction. Podhajski et al. (2009) found that effective professional development, which informs teacher knowledge, can have a positive effect on children's reading performance, in particular for children from lower socioeconomic environments. To be certain, it will take time and effort to retrain the current population of practice educators, but our focus must not only rest there. According to recent data published from the National Council on Teacher Quality's (NCTQ) *Teacher Prep Review: Strengthening Elementary Reading Instruction*, only 25% of teacher training programs include training methods based on the science of reading (Ellis et al., 2023). We ultimately do nothing to stem the tide of failure if university-level teacher preparation programs do not stop training teachers in ineffective literacy practices while eschewing the known science on effective literacy pedagogy. Considering the urgent nature of the staggering reading failure rate in this country and the time it will take to retrain and/or prepare current and future teachers, we must act decisively and immediately to focus only on effective reading curricula in mandated collegiate level literacy courses. Interviewed for a recent article in the *New York Times* (Mervosh, 2023), former education official Dr. Susan Neuman demonstrated similar concern, "that it's déjà vu all over again." Under congressional oversight in 2000, the National Reading Panel's report made clear the necessity of phonics instruction for the development of effective readers. However, the ensuing two decades saw school districts either piecemealing reading programs to

accumulate a hodgepodge of well-liked practices or following the popular opinions and feelings of Whole Language advocates to adopt curricula that simply do not include enough explicit and systematic phonics instruction. School principal Robert Palazzo, as quoted in the *New York Times* article, did just that in his selection of a very popular, but ultimately ineffective reading curriculum. He notes, "I had to swallow my pride and realize that selecting that was a mistake." After adopting a new phonics-based curriculum and adding additional intervention time for phonics, Mr. Palazzo's third graders are now proficiently reading at about 60%—up from 30% prior to the instructional shift. To counter our current reading failure crisis, we will need educators and leaders with similar humility to correct course when it is clear that, in many instances of curriculum selection, we just got it wrong. And we don't need to spend precious months and years engaged in endless debate and paralysis by analysis. Effective, systematic phonics-based curricula already exist; we do not need to reinvent the wheel. We only need to adopt it. The time for debate has passed. As Ohio governor Mike DeWine put it, "the evidence is clear . . . the verdict is in" (Mervosh, 2023, p. 18) and the time is now.

Data Availability The authors confirm that we did not analyze or generate any datasets, because this work proceeds within a theoretical approach.

Declarations

Conflicts of Interest We have no known conflict of interest to disclose.

References

Ainsworth, M. K., Evmenova, A. S., Behrmann, M., & Jerome, M. (2016). Teaching phonics to groups of middle school students with autism, intellectual disabilities, and complex communication needs. *Research in Developmental Disabilities, 56*, 165–176.

Allor, J. H., Mathes, P. G., Roberts, J. K., Jones, F. G., & Champlin, T. M. (2010). Teaching students with moderate intellectual disabilities to read: An experimental examination of a comprehensive reading intervention. *Education & Training in Autism & Developmental Disabilities, 45*(1), 3–22.

Archer, A. L., & Hughes, C. A. (2010). *Explicit instruction: Effective and efficient teaching*. Guilford.

Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 1*(1), 91–97.

Barshay, J., Flynn, H., Sheasley, C., Richman, T., Bazzaz, D., & Griesbach, R. (2021). America's reading problem: Scores were dropping even before the pandemic. *The Hechinger Report*. https://hechingerreport.org/americas-reading-problem-scores-weredropping-even-before-the-pandemic/

Bohn, R. E., & Short, J. E. (2009). How much information: 2009 report on American consumers. *University of California-San Diego*. http://hmi.ucsd.edu/howmuchinfo.php

Bowers, J. S. (2020). Reconsidering the evidence that systematic phonics is more effective than alternative methods of reading instruction. *Educational Psychology Review, 32*, 681–705.

Bradley, R. L., & Noell, G. H. (2018). The effectiveness of supplemental phonics instruction employing constant time delay instruction for struggling readers. *Psychology in the Schools, 55*(7), 880–892.

Castles, A., Rastle, K., & Nation, K. (2018). Ending the reading wars: Reading acquisition from novice to expert. *Psychological Science in the Public Interest, 19*, 5–51. https://doi.org/10.1177/1529100618772271

Chall, J. S. (1967). *Learning to read: The great debate*. McGraw-Hill.

Ciresi Walburn Foundation. (2023). Why can't little Sven & Helga read? https://www.ciresiwalburnfoundation.org/why-cant-little-sven-helga-read

Cooper, J. O., Heron, T. E., & Heward, W. L. (2020). *Applied behavior analysis*. Pearson.

DiMarco, B. (2022, October 6). Sounding out a better way to teach reading. *New York Times*. https://www.nytimes.com/2022/10/06/education/learning/schols-teaching-readingphonics.html

Dewitz, P., & Graves, M. F. (2021). The science of reading: Four forces that modified, distorted, or ignored the research finding on reading comprehension. *Reading Research Quarterly, 56*(1), 131–144.

Duke, N. K., & Cartwright, K. B. (2021). The science of reading progresses: Communicating advances beyond the simple view of reading. *Reading Research Quarterly, 56*(S1), 525–544.

Educational Advisory Board (EAB). (2023). Narrowing the third-grade reading gap: Embracing the science of reading. *District Leadership Forum. Research Briefing*. https://eab.com/research/district-leadership/study/narrowing-the-third-grade-reading-gap-research-brief/

Elleman, A. M., & Oslund, E. L. (2019). Reading comprehension research: Implications for practice and policy. *Policy Insights from the Behavioral & Brain Sciences, 6*(1), 3–11.

Ellis, C., Holston, S., Drake, G., Putman, H., Swisher, A., & Peske, H. (2023). *Teacher prep review: Strengthening elementary reading instruction*. National Council on Teacher Quality.

Fensterwald, J. (2022). California does little to ensure all kids read by third grade: Other states embrace science of reading with books, training, coaching. *Edsource*. https://edsource.org/2022/california-does-little-to-ensure-all-kids-read-by-3rdgrade/677257

Finnegan, E. G. (2012). Two approaches to phonics instruction: Comparison of effects with children with significant cognitive disability. *Education and Training in Autism & Developmental Disabilities, 47*(3), 269–279.

Fletcher, J. M., Savage, R., & Vaughn, S. (2021). A commentary on Bowers (2020) and the role of phonics instruction in reading. *Educational Psychology Review, 33*, 1249–1274.

Gabriel, R. (2020). The future of the science of reading. *The Reading Teacher, 74*, 11–18.

Gardner, R., Rizzi, G. L., & Council, M. (2014). Improving educational outcomes for minority males in our schools. *Interdisciplinary Journal of Teaching & Learning, 4*(2), 81–94.

Green, E. L., & Goldstein, D. (2019, December 5). Reading scores on national exam decline in half the states. *New York Times*. https://www.nytimes.com/2019/10/30/us/reading-scoresnational-exam.html

Greer, R. D. (2002). *Designing teaching strategies: An applied behavior analysis systems approach*. Elsevier.

Gough, P., & Tunmer, W. (1986). Decoding, reading, and reading disability. *Remedial & Special Education, 7*, 6–10.

Heward, W. L., & Twyman, J. S. (2021). Teach more in less time: Introduction to the special section on direct instruction. *Behavior Analysis in Practice, 14*, 763–765.

Hill, B. (2023, February 20). Chicago democrat sounds alarm as 55 schools report no proficiency in math or reading: 'Very serious'. *Fox News*. https://www.foxnews.com/media/chicagodemocrat-sounds-alarm-55-schools-report-no-proficiency-math-reading-serious

Hoover, W. A., & Gough, P. B. (1990). The simple view of Reading. *Reading & Writing: An Interdisciplinary Journal, 2*, 127–160.

Hughes, C. A., Morris, J. R., Therrien, W. J., & Benson, S. K. (2017). Explicit instruction: Historical and contemporary contexts. *Learning Disabilities Research & Practice, 32*(3), 140–148.

Johnson, K., & Street, E. M. (2004). The Morningside Model of Generative Instruction: An integration of research-based practices. In D. J. Moran & R. W. Malott (Eds.), *Evidence-based educational methods* (pp. 247–265). Academic Press.

Keaton, J. (2022). Literacy dashboard event shows Covid's effect on state of literacy in Cleveland. *WKYC Studios*. https://www.wkyc.com/article/news/education/educationstation/education-station-literacy-dashboard-covid-effect-literacy-cleveland/95-e45a6f1f802d-4ad1-a1f5-6d918fb95b43

Laufer, B., & Aviad-Levitzky, T. A. M. I. (2017). What type of vocabulary knowledge predicts reading comprehension: Word meaning recall or word meaning recognition? *Modern Language Journal, 101*(4), 729–741.

Lyon, G. Reid. (2015). *Why do some children have difficulty learning to read*? Learning Disabilities Association of Ontario. https://www.ldao.ca/introduction-to-ldsadhd/articles/about-lds/why-do-some-children-have-difficulty-learning-to-read/

Luscombe, B. (2022, August 12). The great reading rethink. *Time Magazine, 200*(7/8), 63–67.

Mervosh, S. (2023, April 16). “The kids can’t read”: The revolt that is taking on the education establishment. *New York Times*. https://www.nytimes.com/2023/04/16/us/science-ofreading-literacy-parents.html

Moats, L. C. (2020). Teaching reading" is" rocket science: What expert teachers of reading should know and be able to do. *American Educator, 44*(2), 4.

Moats, L. C. (2023). Commentary: Teaching expertise is the best antidote for educational inequities. *School Psychology, 38*(1), 42. https://doi.org/10.1037/spq0000497

National Assessment of Educational Progress. (2023). NAEP report card: 2022 NAEP reading assessment. *The Nation’s Report Card*. https://www.nationsreportcard.gov/highlights/reading/2022/

National Reading Panel. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction* (NIH Publication No. 00-4769). National Institute of Child Health & Human Development, U.S. Government Printing Office.

Nicols, L. (2013). *The effectiveness of using a written response strategy for responding to texts*. Connecticut Association for Reading Research. https://ctreadingresearch.org/the-effectiveness-of-using-a-written-response-strategy-for-responding-to-texts/

O’Brien, C. (2022). Parents cast blame for ’devastating’ nation’s report card in wake of pandemic: ‘Very bad decisions’. *Fox News*. https://www.foxnews.com/media/parentscast-blame-devastating-nations-report-card-wake-pandemic-very-bad-decisions

Papst, C. (2022). 77% tested at Baltimore high school read at elementary level, some at kindergarten level. *Fox Baltimore*. https://foxbaltimore.com/news/project-baltimore/77tested-at-baltimore-high-school-read-at-elementary-level-71-at-kindergarten

Podhajski, B., Mather, N., Nathan, J., & Sammons, J. (2009). Professional development in scientifically based reading instruction: Teacher knowledge and reading outcomes. *Journal of Learning Disabilities, 42*(5), 413–417.

Roberts, G. J., Hall, C., Cho, E., Cote, B., Lee, J., Qi, B., & Van Ooyik, J. (2022). The state of current reading intervention research for English learners in grades K-2: A best-evidence synthesis. *Educational Psychology Review, 34*, 335–361.

Royer, D. J., Lane, K. L., Dunlap, K. D., & Ennis, R. P. (2019). A systematic review of teacher delivered behavior-specific praise on K–12 student performance. *Remedial & Special Education, 40*(2), 112–128.

Rupley, W. H., Blair, T. R., & Nichols, W. D. (2009). Effective reading instruction for struggling readers: The role of direct/explicit teaching. *Reading & Writing Quarterly, 25*(2–3), 125–138.

Scarborough, H. S. (2001). Connecting early language and literacy to later reading (dis)abilities: Evidence, theory and practice. In S. B. Neuman & D. K. Dickinson (Eds.), *Handbook of early literacy research* (Vol. 1, pp. 97–110), Guilford.

Schwartz, S. (2022). States are pushing changes to reading instruction but old practices prove hard to shake. *Education Week, 42*(1), 19–20.

Seidenberg, M. S., Cooper Borkenhagen, M., & Kearns, D. M. (2020). Lost in translation? Challenges in connecting reading science and educational practice. *Reading Research Quarterly, 55*, S119–S130.

Semingson, P., & Kerns, W. (2021). Where is the evidence? Looking back to Jeanne Chall and enduring debates about the science of reading. *Reading Research Quarterly, 56*(1), 157–169.

Shanahan, T. (2020). The science of reading: Making sense of research. *The Reading Teacher, 74*, 119–125.

Simonton, S. (2016). Reading difficulty in young children linked to later trouble with the law. *Juvenile Justice Information Exchange,* https://jjie.org/2016/07/18/reading-difficulty-in-young-children-linked-to-later-troublewith-the-law/

Sohn, E. (2020). It’s time to stop debating how to teach kids to read and follow the evidence. *Science News*. https://www.sciencenews.org/article/balanced-literacy-phonicsteaching-reading-evidence

Terry, N. P. (2021). Delivering on the promise of the science of reading for all children. *The Reading Teacher, 75*(1), 83–90.

Vaughn, S. (2023). *The science of reading comprehension: Effective reading comprehension instruction*. International Dyslexia Association Georgia.