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Professional Development to Support Teachers' Implementation of Intensive Reading Intervention: A Systematic Review

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Abstract

Many educators are unprepared to meet the needs of students with the most intensive reading intervention needs. The purpose of this review was to identify how researchers have provided professional development (PD) to support educators' implementation of intensive reading interventions, the extent to which these approaches included essential PD elements, and how researchers have measured implementer outcomes. In the 26 studies reviewed, implementers received initial training, and most received some form of ongoing support. Most studies appeared to incorporate one or more essential PD elements, though many lacked sufficient detail regarding the presence of these elements. Researchers used a variety of fidelity measures and other methods to assess implementer outcomes, which were typically positive. Results of this review indicate the need for researchers to report more detailed descriptions of PD activities, as well as the need for continued research on how best to support teachers' implementation of intensive reading interventions.

Keywords

professional development, intensive reading intervention, reading disability

Over the last two decades, teachers have supported students who experience reading difficulties or disabilities through increasingly intensive "tiers" of instruction and intervention. Introduced as Response to Intervention (RTI) by the Individuals with Disabilities Education Improvement Act (IDEA, 2004) and revised to Multi-Tiered Systems of Support (MTSS) through the Every Student Succeeds Act (ESSA, 2015), this system typically consists of three tiers that require teachers to use evidence-based practices and interventions with all students across core academic areas (Gersten et al., 2008). In Tier 1, teachers provide all students with high-quality research-based core reading instruction in general education settings. Students for whom Tier 1 instruction is not sufficient receive Tier 2 support, which typically includes small-group, research-based supplemental interventions targeting specific skills students have difficulty mastering. Students for whom Tier 2 reading interventions are not sufficient may need even more specialized *intensive intervention*, typically provided at Tier 3 or as part of special education services (D. Fuchs et al., 2014; National Center on Intensive Intervention, n.d.).

Although research-based approaches to intensive reading intervention exist (e.g., D. Fuchs et al., 2014; L. S. Fuchs et al., 2018), many teachers are not prepared to implement them (Lemons et al., 2016). Successful implementation of intensive interventions requires specialists with broad and well-developed skill sets: They must be able to integrate knowledge of reading development and difficulties/disabilities with deep content knowledge and specialized instructional techniques (D. Fuchs et al., 2012). Many teachers need support developing this broad and deep skill set through systematic professional development (PD).

Although PD for intensive intervention likely would benefit teachers regardless of instructional content, we focus on *reading* given its importance for long-term success in school and beyond (Snow, 2002). Whereas researchers have developed and tested instructional approaches that benefit many students with intensive reading needs, a small but persistent proportion of students experience minimal benefits from these approaches (e.g., Wanzek & Vaughn,

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2009). Identifying features of PD that aid teachers to be responsive to these students is critical for determining how best to support readers with the most significant needs.

To explore how researchers have supported teachers in implementing intensive reading interventions, we reviewed the research on intensive reading interventions across grade levels focusing on PD provided to school-based intensive intervention implementers (e.g., special educators, intervention specialists, and other related personnel). In doing so, we evaluated the PD described in the literature using a framework proposed by Desimone and Garet (2015; Desimone, 2009). Furthermore, we identified patterns in training and PD practices across the literature that support the need to establish procedures for future PD research and reporting to enhance the training of teachers who provide intensive intervention.

Research on Intensive Reading Intervention

Researchers have described two general approaches to programming intensive interventions (D. Fuchs et al., 2014). In the first approach, an established, standard-protocol Tier 2 intervention is intensified by reducing group size and/or increasing the total duration of the intervention. In the second approach, intensive intervention is programmed using Data-Based Individualization (DBI). DBI is an iterative process through which the teacher implements an evidence-based intervention, uses validated progress monitoring tools to closely monitor student progress, and modifies instruction as needed based on student responsiveness.

Previous reviews of research on intensive reading intervention have considered both approaches and found each to improve outcomes for readers with significant difficulties. Reviews of the first approach have found intervention implementation at a high dosage (e.g., 100 or more sessions for Grades K–3 and 75 or more sessions for Grades 4–12) to improve outcomes of struggling readers, with moderately positive effect size (ES) for young children ($ES = .39$; Wanzek et al., 2018) and small effects for older students ($ES = .10$ to .16; Wanzek et al., 2013). For students in Grades K–3, intensifying interventions by increasing dosage may also be effective for accelerating student reading growth but may not be enough to close the gap between them and their typically achieving peers (Austin et al., 2017).

Evidence indicates that the second approach—using DBI—can also accelerate student progress (Austin et al., 2017; Jung et al., 2018). In a meta-analysis of studies in which teachers used curriculum-based measurement (CBM; Deno, 1985) as part of a DBI process to individualize reading, math, and writing instruction, Jung et al. (2018) reported moderate effects of DBI across academic areas (Hedges's $g = .37$ to .38). Effects specific to reading were smaller ($g = .28$), and were influenced by several factors, including the type and frequency of supports provided to teachers, with larger effects associated with more frequent support provided by DBI experts ($g = .66$). In other words, support to teachers appeared to be a critical ingredient in the effectiveness of intensive reading interventions using a DBI approach.

Recently, L. S. Fuchs et al. (2018) developed a "Taxonomy of Intervention Intensity" that includes seven research-based dimensions that teachers can use to evaluate and intensify interventions. A chosen intervention should (a) demonstrate adequate *strength* through strong effect sizes on reading outcomes of students similar to the target student; (b) ensure sufficient *dosage* through opportunities for student response and feedback; (c) demonstrate *alignment* with the student's specific academic skill needs; (d) include *attention to transfer* to ensure that the student makes connections between learned and related skills and uses those skills across different contexts; (e) be *comprehensive*, which refers to the extent to which the intervention uses components of explicit instruction; (f) include *behavioral supports* that adhere to sound behavioral principles and promote self-regulation; and (g) incorporate *individualization* using validated progress monitoring procedures to adjust instruction to meet student needs.

Bridging Research and Practice Through Professional Development

Although current research highlights promising methods of intensifying reading instruction, such approaches are not widely used. Teachers encounter several challenges in providing intensive interventions, such as matching interventions to students' specific needs, collecting and interpreting data, and making instructional changes based on data (Lemons et al., 2016). Furthermore, many teachers lack adequate knowledge of reading concepts, assessments, and the data-based decision-making process needed to help struggling students (Spear-Swerling & Cheeseman, 2012). To help teachers gain knowledge and skills needed to intensify instruction, it is imperative to support them in ways that make the process understandable and feasible. This support may best begin by ensuring that teachers receive high-quality PD specifically geared toward helping them meet the needs of readers with significant and persisting difficulties.

A Framework for Effective Professional Development

To understand what such support should entail, it is useful to identify components that comprise effective PD. Garet et al. (2001) did this by examining the relation between PD features and changes in teacher knowledge and practice.

They found that specific *features* (content focus, active learning, coherence with other learning) and *structures* (a study group format, extended duration of activities, groups of teachers participating together) related to changes in teacher practice. Desimone (2009) summarized these practices into a framework that specifies that PD should (a) *focus on subject matter content* and how students learn that content; (b) include *active learning*, with opportunities to observe expert teachers, receive feedback, engage in discussion, and analyze student work; (c) *align* with school priorities and student needs; (d) be *ongoing* over a period of time; and (e) allow teachers from the same grade, subject, or school *participate together* and build a learning community.

More recent work examining the effectiveness of PD has revealed that relations among these factors and student outcomes can be complicated, and other factors may be important to consider. For example, researchers have found that PD of the longest duration does not necessarily produce the strongest effects (Brock & Carter, 2016; Kennedy, 2016). Furthermore, PD that includes follow-up and feedback on implementation may be more effective than one-time trainings (Brock & Carter, 2016; Brock et al., 2017; Fallon et al., 2015). Others have noted smaller effects for PD exclusively focused on content knowledge (e.g., Kennedy, 2016). Evidence is inconsistent regarding whether collective participation itself predicts effects or if the content of professional activities may be more predictive (Desimone, 2015; Kennedy, 2016). Finally, teacher-level variables such as prior content knowledge and experience, and contextual variables such as student disability status, language proficiency, and school setting may influence PD effects (Desimone & Garet, 2015).

Previous Studies Examining Effective PD for Teachers of Struggling Readers

Several studies of PD for teachers of struggling readers have included elements of Desimone's (2009) framework. These studies included teachers who delivered reading instruction in a variety of settings with students of different ages; however, most research focused on elementary teachers and on improving Tier 1 instruction. Outcomes have demonstrated promise for increasing teachers' instructional skills and student achievement when PD incorporates elements of the framework. For example, to improve Tier 1 reading instruction, O'Connor et al. (2005) provided PD in scientifically based reading instruction to general education teachers in kindergarten through third grades. PD included a *content focus* on reading skills and strategies, *ongoing* training and support throughout the school year, and *active learning* opportunities to discuss what was learned, share implementation plans, and discuss student progress and data. After participating in PD, kindergarten and first-grade teachers increased small-group instruction time and a focus on decoding and letter-sound instruction, and second- and third-grade teachers included more time for students to read aloud.

In a similar study, Bryant and colleagues (2000) provided PD to improve the reading instruction of middle-school general education content area teachers to benefit struggling readers, some of whom had disabilities. Content area and inclusion special education teachers participated in PD focused on word identification, fluency, and comprehension strategies to implement during content area classes. PD sessions included *active learning* with modeling and guided practice. *Collective participation* involved teachers from the same school-based team participating in PD and planning implementation together. PD was *ongoing* with three sessions spread across 2 months and follow-up support. Effects were mixed with moderate levels of fidelity (69%–70%) for comprehension and fluency strategies and low levels of fidelity for word identification (47%). Despite mixed teacher results, students with disabilities showed significant increases in word identification and fluency after receiving instruction ($ES = .64$ to .67).

In another example, Vernon-Feagans et al. (2013) provided PD to kindergarten and first-grade teachers to aid implementation of reading intervention for struggling readers in their classrooms. PD was *ongoing*, with an initial 3-day training and support from a literacy expert continuing through the school year, and it included *active learning* opportunities for teachers to practice instructional techniques. Teachers reported moderate to high implementation fidelity (80%–96%), and struggling readers in schools where teachers received PD significantly outperformed struggling readers in control schools in word reading, spelling, and comprehension ($ES = .36$ to .63).

Current Synthesis

The studies reviewed above provide promising evidence that PD that incorporates elements of Desimone's (2009) framework can support teachers' implementation of less intensive reading interventions in ways that improved student outcomes. The purpose of the current systematic review was to explore how researchers have reported supporting school-based implementers' provision of more intensive interventions for struggling readers through PD. Furthermore, we aimed to determine the extent to which this PD aligned with effective elements from the literature (Desimone, 2009). We use a combination of both approaches to intensifying intervention along with L. S. Fuchs et al.'s (2018) Taxonomy of Intervention Intensity to define intensive intervention for this review, which addresses the following questions:

Research Question 1. How have researchers supported implementation of intensive reading intervention with PD?
Research Question 2. To what extent does this support align with essential PD elements (e.g., Desimone, 2009)?
Research Question 3. How have researchers measured the effects of PD on implementer outcomes?

Method

Inclusion Criteria

Studies were included in this review if they met the following criteria. First, we included studies published in peer-reviewed journals, technical reports, and dissertations (we imposed no date limits). Studies had to be written in English and could include a range of methodologies. We categorized studies as qualitative if only qualitative data were collected and analyzed (e.g., interviews, case studies), experimental or quasi-experimental designs if some method of experimental control was used (e.g., single-case design, randomization, control group), descriptive if the study included only quantitative measures without an experimental manipulation, or mixed methods if the study included both quantitative and qualitative methods.

Second, studies had to report an intensive reading-related intervention delivered to students (pre-K to Grade 12) identified as experiencing reading difficulty (including students identified as "at risk" or low performing compared with grade-level peers, as nonresponsive to intervention, or as having a reading-related disability). To be related to reading, interventions could address any of the following areas: phonological awareness, phonics or word recognition, fluency, vocabulary, or reading comprehension. To be considered "intensive," we considered both approaches to intensifying interventions presented by D. Fuchs et al. (2014). For the first approach (focusing on group size and duration), we adapted Wanzek et al.'s (2013) dosage criteria. To be considered intensive, the intervention had to be delivered across at least 75 sessions of 30 min each (Wanzek et al., 2013) *or* a total of 37.5 hr delivered at least 3 days per week (which is equivalent in total time to Wanzek et al.'s [2013] criteria). Furthermore, it had to be delivered individually or in a small group (two to eight students). For the second approach—using DBI to intensify the intervention—an intervention could be considered "intensive" if it was adjusted according to at least one of the seven dimensions of the L. S. Fuchs et al. (2018) taxonomy (strength, dosage, alignment, comprehensiveness, attention to transfer, behavioral support, or individualization) in response to specific student needs. For example, if a study included opportunities for teachers to increase opportunities for student responding when data indicated insufficient student progress, it would meet criteria for this second approach.

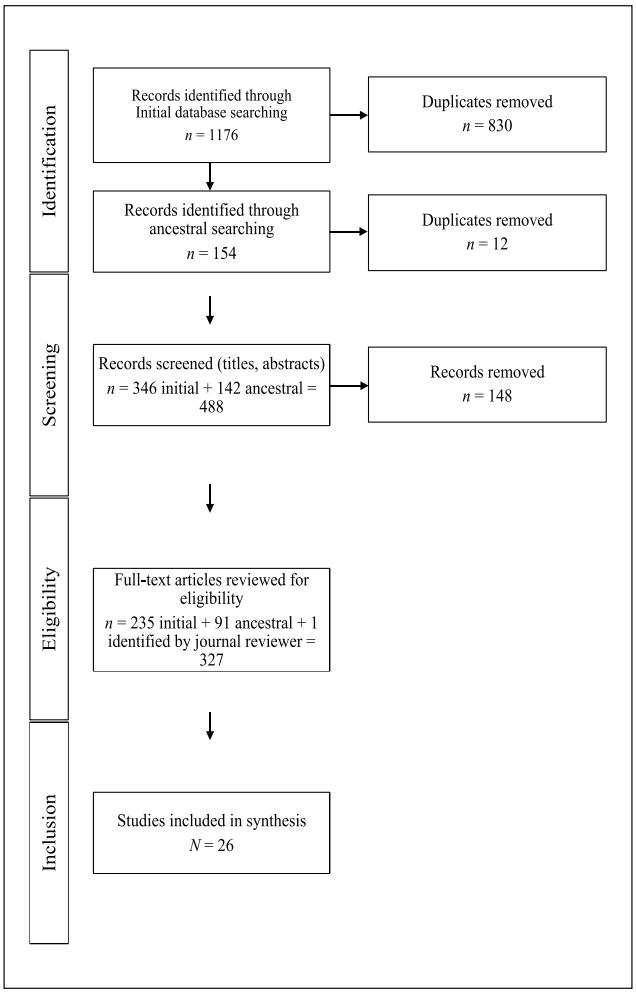

Figure 1. PRISMA diagram.
Note. PRISMA = Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

Third, studies had to be conducted in school settings and include school personnel as implementers (e.g., teachers, educational assistants/para-educators, related service providers, tutors, or intervention specialists). Studies had to include a description of how the interventionists were trained and include outcomes for implementers that clearly related to intervention implementation, such as measures of implementation fidelity, implementer knowledge and skills, teacher efficacy, social validity of the PD provided, or quality-related outcomes such as interviews of teachers' perceptions of the PD received.

Literature Search

To identify relevant literature that met the criteria for this review, we followed a six-step process (see Figure 1). First, we searched Academic Search Premier, Education Source, ERIC, and PsycINFO, combining terms in the following categories

(contact first author for specific terms): *implementer* AND *disability status* AND *professional development* AND *reading intervention* AND *intensive intervention*. We limited our search to papers written in English. From this initial search, we identified 1,176 articles.

Second, we eliminated all duplicates from the electronic searches ($n = 830$). Third, we divided the remaining articles among all five authors and screened titles and abstracts to eliminate any records that clearly did not fit inclusion criteria. For each author, we randomly selected 20% of records included in the title/abstract screen for another author to screen. Interrater agreement (IRA) was 81%. We discussed and resolved all disagreements. Fourth, remaining articles ($n = 235$) were reviewed in full to determine whether they met inclusion criteria. Again, for each author, we randomly selected 20% of records included in the title/abstract screen for another author to screen. IRA for full-text screening was 100%.

Fifth, we coded the 34 retained studies according to the coding system described below. In doing so, we realized that we needed to refine our coding system, as we had included studies ($n = 11$) in which university-based researchers implemented the intervention, when our intention was to focus on school-based implementers. Thus, we refined inclusion criteria to include school-based implementers only and removed the 11 studies, along with several others ($n = 8$) that did not fully meet criteria (e.g., they did not report teacher measures or the intervention did not meet our "intensive" definitions). This process left 15 eligible studies from our initial search.

Sixth, we conducted an ancestral search of all primary studies identified in the initial full-text screen, as well as of relevant syntheses that emerged from the initial search (Austin et al., 2017; Elbaum et al., 2000; Pullen et al., 2011; Scammacca et al., 2007; Torres, 2016; Wanzek et al., 2016). From the primary studies, we identified and screened 45 titles and abstracts. After removing duplicates ($n = 7$) or studies that were clearly not eligible ($n = 24$), we conducted a full-text screen of nine articles, four of which were retained for this review. From the syntheses, we identified and screened 109 titles and abstracts. After removing duplicates ($n = 5$) or studies that were clearly not eligible ($n = 27$), we conducted a full-text screen of 82 additional articles, six of which were retained for this review. The number of eligible studies from the ancestral search was $n = 10$. We randomly selected 20% of articles identified in the ancestral search for IRA; agreement was 100% for primary studies and 93.33% for syntheses. Finally, a reviewer of an earlier version of this manuscript alerted us to an article published just after our initial search in December 2017 that met inclusion criteria (Brownell et al., 2017). This article was screened by two authors who agreed it should be included. Thus, a total of 26 studies met inclusion criteria for this synthesis.

Coding

Study Descriptive Coding entailed coding study details related to participants, implementers, and intervention. *PD Elements Coding* entailed coding studies based on the extent to which Desimone's (2009) essential elements were included in PD provided to intensive reading intervention implementers (note that Desimone, 2009 proposed five elements but we divided *ongoing* PD into two parts—whether it was for an extended duration as well as whether supports were provided beyond initial training). All coding was completed in Qualtrics (available from first author). We randomly selected 20% of studies and re-coded for IRA (agreements divided by agreements plus disagreements); overall IRA was 93.3% (range = 60%–94%). The study with 60% agreement required consensus coding because it included both single-case and group design data, which led to some confusion (e.g., coders initially coded different information for some of the items, such as sample size). There were no other consistent disagreements across or within coders. Other disagreements tended to arise as a result of study authors' inconsistency in reporting. For example, one study reported that small groups were to include two to 10 students as inclusion criteria in the methods but also reported small groups of four to six students for classes included in final analyses. In this case, coders coded different information regarding group size. All disagreements were discussed and resolved. Codes and their definitions can be obtained in the supplementary online materials (Table 1S).

Results

Descriptive Information

To organize results, we categorized the 26 studies based on authors' purpose: (a) *intervention efficacy studies* evaluating effects of intensive or intensified reading intervention on child outcomes ($n = 17$), or (b) *implementation studies* targeting school-based implementers' use of intensive intervention practices ($n = 9$). Table 1 indicates the purpose of each study and features of intensive interventions that were implemented. Most used group experimental or quasi-experimental designs ($n = 20$). Most ($n = 16$) efficacy studies were experimental, whereas half of the implementation studies included qualitative ($n = 3$) or mixed ($n = 1$) methods.

Student participants. All but five studies reported the total number of students who received intensive intervention, with a median $n = 72$ (range = 3–380) and a total $N = 1{,}971$ students across studies. All but two studies indicated students' grade levels. Although we sought to include studies that spanned all grades, we found no eligible studies conducted with pre-K or high school students. Most studies ($n = 17$) included early-elementary students (K through

Table 1. Elements of Intensive Intervention.

	Intensive elements					Intensification elements					
Study	Freq.	Session duration	Setting	Overall duration	Group size	Behavior support	Strength	Individ. using data	Dosage	Align.	Compre.
Implementation Studies											
Allor et al. (2010)	X	X				X		X			
Anderson (2009)	X	X	X								
Bock and Erickson (2015)	X	X	X		X					X	
Brownell et al. (2017)	X	X		X	X		X	X	X		
Bursuck et al. (2004)	X		X		X						
De La Cruz (2009)	X	X		X	X						
Dingle et al. (2011)	X	X	X		X				X		
Neugebauer et al. (2016)	X	X			X						
Siuty et al. (2016)	X	X	X		X			X			
Intervention Efficacy Studies											
Browder et al. (2008)	X	X	X	X	X						
Brown et al. (2005)	X	X	X		X		X	X			
Denton et al. (2008)	X	X	X	X	X			X			
Denton et al. (2006)	X	X	X	X	X	X		X		X	
Denton et al. (2013)	X	X	X		X	X		X	X		
L. S. Fuchs et al. (1984)	X	X			X			X			
Gelzheiser et al. (2011)	X	X			X			X			
Hof-Dunn (2015)	X	X	X		X						
Jitendra et al. (2004)	X	X	X		X						
Mathes et al. (2005)	X	X		X				X			
Pinnell et al. (1994)	X	X	X	X	X				X	X	
Tamm et al. (2017)	X	X	X	X	X						
Torgesen et al. (2010)	X	X		X	X						
Vadasy and Sanders (2011)	X	X		X	X		X	X	X	X	X
Vadasy et al. (2008)	X	X		X	X						
Vadasy et al. (2005)	X	X			X						

Note. Freq. = frequency; Individ.= individualization; Align. = alignment; Compre.= comprehensiveness; X = element present in the study.

Grade 2), eight were with late-elementary students (Grades 3–5), and only one was with middle-school students (Grades 6–8). A total of 46% of studies reported few or no details regarding students' sociodemographic characteristics. Studies that did include such information included students with diverse racial/ethnic backgrounds, with most studies including students from minoritized groups (across studies, 0%–70% of students were White, 14%–57% Black, 7%–38% Hispanic, 0%–43% Asian, 0%–1% Native American or Pacific Islander, and 5% "other"). Most studies included schools with at least 25% of students who experienced economic disadvantages. Demographic information by study is provided in the online supplemental materials (Table 2S).

Of the studies that reported information relating to students' disability status, 20 included students at risk ($n = 9$) or with disabilities ($n = 11$). Participating students had a variety of disabilities, including Autism Spectrum Disorder (ASD; $n = 4$), Developmental Disability/Delay ($n = 1$), Cognitive Impairment ($n = 3$), Emotional/Behavior Disorders ($n = 2$), and Specific Learning Disability ($n = 6$). Eight studies included English Language Learners.

Implementers. Intervention implementers were typically described in less detail than were student participants. In total, 148 teachers (general education, special education, or reading specialists), 68 para-educators, and 31 unspecified school-based implementers received PD to implement intensive intervention. In studies in which background information was provided ($n = 17$), implementers had 0–36 years of experience and diverse ethnic/racial backgrounds (e.g., Caucasian/White, African American/Black, Hispanic/Latinx). Six studies described highest degrees earned. Of these, all included implementers with master's, three with bachelor's, and one with associate's degrees; two reported high school diplomas.

Intensive Intervention Features

Intensive interventions targeted a wide range of reading skills. Most were multicomponent ($n = 20$). The most common components addressed were phonics ($n = 16$), word reading ($n = 16$), and fluency ($n = 14$). Intervention sessions were typically held 4 to 5 times per week ($M = 4.4$; range = 2–5) for an average of 39 min ($M = 39.3$; range = 18–90).

Only 13 studies reported the location of intervention, typically outside of the classroom. Of the 17 studies that described instructional grouping, most implemented intervention in small groups ranging between two and six students ($n = 9$); the remaining intervened individually ($n = 8$).

Study authors conceptualized interventions as "intensive" in varying ways (see Table 1). All interventions met our criteria for intensive based on frequency, and all but one based on the duration of each session. Another common method of intensification was through having a small-group size ($n = 22$). In 12 studies, implementers did not modify or make decisions regarding intervention elements but rather implemented the intervention as originally designed. For the remaining 14 studies, implementers intensified interventions during the study period based on student needs. We categorized these intensifications based on L. S. Fuchs et al.'s (2018) taxonomy. The most frequently described intensification element was individualization based on data ($n = 11$). Additional elements were included in three studies (behavioral support, dosage, or alignment). Researchers in one study intensified intervention by selecting a different intervention with more research evidence (Brown et al., 2005). No study reported intensifying intervention by altering comprehensiveness (i.e., increasing the explicitness of instruction).

Professional Development

Our first research question sought to find how researchers supported implementation of intensive reading intervention through PD. Table 3S in the online supplemental materials includes descriptions of PD provided to implementers to support intensive intervention. Most studies ($n = 20$) delivered PD through workshops—typically 1- to 2-day trainings provided to a group of implementers. Generally, studies provided limited details about these trainings, often just one or two sentences. In a typical example, Neugebauer et al. (2016) noted, "Interventionists received 2 days of professional development on the program and booster trainings when needed" (p. 159).

The remaining studies delivered PD through a variety of methods described with varying levels of detail. For example, Brownell et al. (2017) trained teachers using literacy learning cohorts using Desimone's (2009) essential elements. They began with an institute training, followed by monthly small-group meetings and individual coaching. Brown et al. (2005) provided practicum experiences for implementers. One group of tutors conducted a lesson while a lead trainer and other tutors observed, followed by a debriefing session, and then a new group of tutors conducted a lesson. Dingle et al. (2011) provided an institute training that included videos of effective teachers and opportunities to practice together. L. S. Fuchs et al. (1984) provided 1:1 training sessions, but merely stated that teachers were taught to use the target program. Pinnell et al. (1994) compared two approaches: one included observations of teachers using a one-way glass screen and in-service hours spread over a period of time; the other did not include observations and included massed in-service hours.

Most studies ($n = 20$) provided ongoing support using a variety of methods, such as ongoing coaching or consultation in addition to initial training ($n = 13$). This support was typically provided on a weekly to monthly basis. Some studies provided ongoing support through follow-up training sessions ($n = 4$) or meetings ($n = 2$). Descriptions of these supports were limited. PD duration, reported for 23 studies, varied widely ($M = 23$ hr; range = 2 to 72.5).

Studies include a range of types of PD providers, with limited information about their qualifications. Researchers were the most common PD providers ($n = 15$). In the remaining studies, PD was led by trained teachers ($n = 2$), a reading coach ($n = 1$), a content expert ($n = 1$), or a curriculum representative ($n = 1$). No information was provided on the background of these PD providers, with the exception of De La Cruz (2009), who indicated that the content expert had extensive experience teaching reading to students with disabilities and had been a provider of special education for many years. Five studies did not report any information on PD providers.

Alignment With Desimone's (2009) Essential Elements

Table 2 shows the alignment of PD practices with Desimone's (2009) essential elements of effective PD. Elements were coded as "present" if they were described by the authors, "absent" if authors' descriptions clearly indicated this element was not included, or "unclear" if the description was not clear or complete enough to determine presence or absence. Only one study (Dingle et al., 2011) included PD that aligned with all of Desimone's (2009) essential elements. Because their purpose was to examine the effects of PD on teachers' implementation, it makes sense that they provided a more detailed PD description than did studies that focused on intervention effects on student outcomes.

Overall, the extent to which studies aligned with the essential elements varied (Median = 2 elements reported; range = 0–6). The most commonly reported elements were sustained duration of PD (including additional training sessions or ongoing coaching; $n = 20$) and active learning ($n = 16$). Perhaps because many studies focused on evaluating the efficacy of interventions, little information was included on the PD practices used to train implementers. Thus, many of the elements were coded as unclear (Median = 3 elements unclear; range = 0–6). The most common element that was unclear in studies was coherence ($n = 16$); in fact, this element was only clearly reported in six studies. This element required that the article mention that the chosen intervention aligned intentionally with state standards,

Table 2. Studies' Inclusion of Desimone's (2009) Elements.

Study	Content focus	Active learning	Coherence	Ongoing	Extended duration	Collective participation
Implementation Studies						
Allor et al. (2010)	?	+	?	+	?	?
Anderson (2009)	+	+	+	+	–	+
Bock and Erickson (2015)	+	?	+	+	–	+
Bursuck et al. (2004)	?	+	?	+	?	+
Brownell et al. (2017)	+	+	?	+	+	+
De La Cruz (2009)	+	?	+	+	?	+
Dingle et al. (2011)	+	+	+	+	+	+
Neugebauer et al. (2016)	?	?	?	?	?	?
Siuty et al. (2016)	–	+	?	+	?	–
Intervention Efficacy Studies						
Browder et al. (2008)	+	+	?	+	?	?
Brown et al. (2005)	?	+	+	+	+	+
Denton et al. (2008)	?	+	?	+	?	–
Denton et al. (2006)	?	?	?	–	+	?
Denton et al. (2013)	?	?	?	+	+	?
L. S. Fuchs et al. (1984)	–	?	?	+	+	?
Gelzheiser et al. (2011)	+	+	?	+	?	?
Hof-Dunn (2015)	?	+	+	+	+	+
Jitendra et al. (2004)	–	+	?	+	?	–
Mathes et al. (2005)	?	+	+	+	+	?
Pinnell et al. (1994)	?	+	–	+	+	?
Tamm et al. (2017)	?	?	?	+	+	?
Torgesen et al. (2010)	?	?	?	+	+	?
Vadasy and Sanders (2011)	?	+	?	+	–	+
Vadasy et al. (2008)	?	+	?	+	?	?
Vadasy et al. (2005)	?	+	?	+	?	+

Note. ? = unclear as to whether element was present or not present; + = element was present; – = element was not present.

school curriculum, or specific student needs (e.g., low phonemic awareness). Authors rarely provided a specific reason for selecting a particular intervention. Descriptions of PD also lacked clarity in the areas of content focus ($n = 12$) and collective participation ($n = 12$).

Implementer Outcomes

Researchers captured a variety of implementer outcomes (see Table 4S in the online supplemental materials for descriptions and results). The most common measure used was fidelity of implementation. Of those studies measuring fidelity, 14 measured it as a descriptive element to demonstrate internal validity. Only one study (Dingle et al., 2011) measured fidelity as a result of PD effects but did not report quantitative fidelity scores. Rather, they indicated that the three target teachers incorporated skills from the training with changes ranging from minimal to moderate. Researchers typically measured fidelity through observation and most often reported it as a mean percentage. In these studies, fidelity was 85% or higher (range = 85%–98%), indicating that teachers generally implemented the interventions with fidelity. Others reported fidelity with an overall score or individual component scores based on rating scales (e.g., mean fidelity was 4.49 out of 5; Vadasy & Sanders, 2011). A few authors simply reported that fidelity was high, with no further details. Overall, fidelity scores indicated that intensive interventions were being provided with fidelity after teachers attended trainings and, in some cases, after receiving ongoing supports.

The second most common implementer outcome was teacher satisfaction and perceptions of intervention acceptability and feasibility ($n = 7$), typically measured through surveys and interviews. Researchers typically reported descriptive results regarding which aspects of the intervention or PD teachers liked or disliked. These studies uniformly reported that teachers viewed the PD and interventions positively.

Other implementer outcomes included qualitative descriptions of changes in teacher practice ($n = 4$) and teacher knowledge ($n = 1$). Qualitative measures of changes in teacher practice included researchers' observations or implementer reports. For example, L. S. Fuchs et al. (1984) reported that experimental teachers changed instructional

goals for students more often over time and provided more precise statements to describe students' current levels than did control teachers. Results on student-level measures indicated that students of teachers who received training outperformed students of control teachers.

One study (Brownell et al., 2017) measured quality of instruction and time spent using evidence-based practices. This study compared a one-time workshop PD to an ongoing PD developed based on Desimone's (2009) framework. Results indicated that teachers who received ongoing PD outperformed those who received one-time PD on measures of quality of instruction and time engaged in evidence-based practices with effect sizes ranging from $d = .02$ to 1.51. Student measures indicated that the PD also influenced student learning. Students whose teachers received ongoing PD outperformed those whose teachers did not on measures of word attack and nonsense word fluency with effect sizes ranging from $d = .37$ to .46. These results indicate that ongoing PD can result in gains for both teachers and students.

Pinnell et al. (1994) provided a descriptive analysis of teaching practices by describing the percentage of time spent on specific activities (reading, writing, other), as well as lesson length and student engagement. Their results indicated that teachers who received PD spent more time on reading and writing instruction than comparison groups. In addition, they noted that teachers who received PD including the one-way glass observations had teacher interactions better tailored to individual children than those who did not receive this training. This finding suggests that the observations and discussions, as well as training hours provided over a longer period, may help teachers be more student-specific. Anderson (2009) found that a 1-day workshop led to increases in teachers' alphabetic knowledge and strategic word identification skills ($ES = .22$ to .39).

Discussion

In this systematic review, we aimed to explore how researchers have reported supporting school-based implementers' use of intensive reading interventions with PD. To do so, we sought to describe the extent to which PD aligned with Desimone's (2009) essential elements, and to capture how researchers have assessed school-based implementers' outcomes related to their use of intensive interventions. We reviewed 26 studies that met inclusion criteria. In each study, school-based implementers provided intensive reading intervention to meet student needs and received PD to support their instruction. Most studies included a diverse sample of student participants in early-elementary school, with fewer studies targeting older students. Whereas some studies included elements of PD described by Desimone (2009), many did not. In the following sections, we interpret our findings from the literature with regard to our research aims. We then describe the limitations of our review, and conclude by discussing directions for future research and practice related to the intersection of PD and intensive reading intervention.

Supporting Implementation of Intensive Reading Interventions Through PD

Researchers supported implementation of intensive reading interventions through PD in a variety of ways, and described this PD with varying levels of detail that appeared to relate to the primary purpose of the studies. Most studies ($n = 20$) included an initial workshop that was usually led by a researcher and typically lasted 1 to 2 days. Some studies ($n = 14$) included follow-up support beyond the initial training; however, few details about this additional support were provided. Only a few studies ($n = 9$) focused primarily on the effects of PD on implementation of intensive intervention, which may explain the detailed descriptions of PD as compared with studies testing intervention efficacy. This lack of detail makes it difficult to draw conclusions about what makes PD effective for intensive intervention implementation; however, it does suggest more studies focusing on the implementation of intensive intervention are needed. Brownell et al. (2017) was one of the few research groups that comprehensively described the delivery and effects of PD, providing an example of how future studies could be reported.

Alignment With Essential PD Elements

We explored the extent to which PD practices aligned with Desimone's (2009) essential elements, specifically, *content focus, active learning, coherence, sustained duration*, and *collective participation*. Because most studies provided scant descriptions of PD, it was challenging to identify the presence or absence of the practices outlined by Desimone. Reporting of these elements ranged from no alignment with any elements to one study (Dingle et al., 2011) that aligned with all elements.

PD elements most often reported were *ongoing* and *active learning*, indicating that implementers had multiple opportunities and ways to interact with PD content. Previous reviews of PD studies have revealed that, although extended duration generally has *not* been associated with stronger effects (Brock & Carter, 2016; Kennedy, 2016), PD that includes follow-up sessions seems to be more effective (Brock & Carter, 2016; Brock et al., 2017; Fallon et al., 2015). Researchers of studies in our synthesis also appeared to value ongoing PD. When considering the unique needs of students who require intensive intervention that occurs over many sessions, or perhaps years, ongoing support might be especially important as it provides continued guidance for teachers serving students with the most significant academic needs.

It is less clear whether PD included *coherence, content focus*, or opportunities for *collective participation*. Previous reviews have not shown consistent evidence that these elements are associated with stronger effects (Brock & Carter, 2016; Desimone, 2015; Kennedy, 2016). However, it seems important to know more about the role these elements might play in supporting implementation of intensive intervention, specifically. For example, it seems critical that PD for intensive reading intervention emphasizes specific *content* related to reading development, approaches to reading assessment and instruction, specific difficulties encountered by readers with intensive needs, and how best to support those readers. It may also be that *collective participation* focused on data-based decision-making or other problem-solving approaches is important for intensive intervention PD. Because problem solving often happens in teams, a deeper understanding of the role of collective participation seems particularly important.

Implementer Outcomes

Most researchers measured implementers' fidelity of implementation of intensive intervention. In many of these studies, fidelity was included as a measure of the validity of the intervention rather than of the effectiveness of PD per se. When fidelity is used to ensure internal validity of the study, the level of fidelity is typically controlled for to evaluate the effects of the intervention, training, and PD when implemented as intended. Most studies reported high fidelity. No study addressed whether or not teachers maintained acquired skills beyond the specified intervention. Therefore, questions remain about what and how much support is needed to ensure fidelity of intensive intervention or other types of implementer outcomes. Researchers generally did not analyze how fidelity of implementation related to student outcomes. As such, questions remain regarding the extent to which fidelity relates to improved student outcomes.

Some researchers reported and analyzed changes in implementer knowledge or practice (Anderson, 2009; Bock & Erickson, 2015; Brownell et al., 2017; Dingle et al., 2011). The purpose of these studies was to examine effects of PD on implementer behavior. These implementation studies typically provided qualitative descriptions of changes in instructional behaviors and practices. For example, Allor et al. (2010) described how all implementers provided individualized support to students following PD participation. Others, such as De La Cruz (2009), reported implementers' perceptions of the PD and indicated that implementers reported the PD to be beneficial, yet time consuming. In addition, a few authors noted implementers' changes in self-efficacy or motivation because of PD participation. For example, Siuty et al. (2016) reported that implementers who received intervention materials and PD reported higher self-efficacy for providing intensive intervention compared with comparison teachers.

Overall, there does not yet seem to be consensus on what or how implementer outcomes should be measured. Desimone (2009) offers a theory of change that may allow researchers to define proximal, medial, and distal implementation outcomes as a result of PD more clearly. Furthermore, using shared instruments that are valid, reliable, and match the research questions may provide more guidance regarding what PD practices work. The studies included in this review offered a variety of proximal outcomes such as changes in teachers' knowledge and skills, their perceptions of "what works," as well as their self-efficacy and motivation to cause change. A few studies included measures of medial outcomes such as changes in teachers' actual practice and fidelity of implementation. Although many studies included measures of distal outcomes of changes in student progress and achievement, these were not linked to implementer outcomes, making it difficult to glean whether and how the PD itself was effective in promoting improvement in these distal measures. In the future, researchers should consider using shared proximal, medial, and distal measures, and reporting PD practices in greater detail to shed light on what PD practices work for which implementers and under what conditions.

Limitations

Whereas this review provides insight to support and strengthen PD for implementers of intensive intervention, we acknowledge the following limitations. First, although our search terms included a broad range of descriptors for implementers, students' disability status, PD, reading intervention, and intensive intervention, we found that studies used varying terminology for these elements, which made it difficult to capture all relevant studies through the initial search. As a result, we had to rely on ancestral searches for a large portion of the included literature. Perhaps related to the difficulty in identifying relevant studies in the initial phase, IRA for title and abstract screening was just above 80%, right at the threshold for field standards for IRA. Whereas this level of IRA is acceptable, it is low enough to call into question the replicability of our search process and whether we obtained all relevant studies. Furthermore, when searching for articles outside of online databases, there were a few manuscripts that were no longer in print, which likely led to some missing studies.

Another limitation relates to how we defined intensive intervention. To be as inclusive as possible of a relatively small literature base, we used a less-stringent definition of intensive intervention than has been used in other syntheses (i.e., we specified at least 75 sessions of 30-min each *or* a total of 37.5 hr delivered a minimum of 3 days per week *or* intensification based on L. S. Fuchs et al.'s [2018]

taxonomy; others have specified a minimum of 100 sessions, Wanzek et al., 2018). Whereas this definition allowed us to include more studies, it may be that interventions with lower dosage or fewer intensification elements should not really be considered intensive. Implications for PD might be different for less intensive interventions compared with interventions with higher dosage and more intensification elements. An important question is whether the *most* intensive interventions or different approaches to intensification require quantitatively or qualitatively different types of PD support for implementers.

In addition, because we included studies with varying purposes, our results had varying levels of detail related to implementer outcomes. Specifically, only a few studies ($n = 9$) focused primarily on the effects of PD on implementation of intensive intervention, limiting conclusions we could draw related to our primary question. Finally, although Desimone's (2009) framework outlines essential features of effective PD in general, there may be limitations of applying it to implementers of intensive interventions. It is possible that we overlooked important elements that are particularly relevant to intensive intervention, or emphasized elements that are important in other PD contexts, but not in intensive intervention. Future researchers might consider reviewing other frameworks for providing PD, or may look at commonalities of effective PD across studies of intensive intervention that may not have been addressed by Desimone (2009).

Directions for Future Research and Practice

Based on the findings of this review, we highlight a few areas that may support practitioners and guide future research. As others have reported, teachers are likely to have difficulty implementing intensive intervention (Lemons et al., 2016; Spear-Swerling & Cheeseman, 2012). Through this synthesis, we have identified a few promising PD practices that may be helpful for practitioners. We found that many studies implemented PD that extended over several days, included opportunities for active learning, and provided opportunities for ongoing support and training. To support teachers who implement intensive reading interventions, building and district-level leaders should ensure access to PD with these qualities. In other words, teachers who implement intensive reading interventions likely need access to PD that includes many hours of training and support (e.g., 20 or more hr) that extends over time, includes opportunities for coaching or consultation during implementation or follow-up sessions, and has opportunities for teachers to observe and practice learned content.

For future research, we recommend at least three areas to address based on our findings. First, we found that many studies provided little information about explicit PD practices. It would be beneficial for future researchers to include more clear and complete descriptions of PD practices, to enhance the field's knowledge of practices that can support teachers' learning and use of intensive interventions (Proctor et al., 2013). Relatedly, clearer descriptions of PD would be informative for practice, by providing PD facilitators with clearer directions on how to train teachers to implement intensive reading interventions effectively.

Second, more studies that focus primarily on implementation, include research questions focused around PD effectiveness, and measure a range of student and implementer outcomes are needed. We recommend that future researchers use Desimone's (2009) PD framework for laying out specific research questions that address the causal mechanisms between PD and teacher and student outcomes on proximal, medial, and distal measures, as well as mediators and moderators of PD effects. This framework could also be used to plan experimental manipulations, comparing PD that includes similar content but with different structures. This approach could help tease apart critical elements particularly important for implementers of intensive reading intervention.

Finally, it would be useful for future researchers to examine whether implementers' PD needs vary based on the type or intensity of reading intervention. For example, do teachers need more extensive PD to support their use of data to intensify intervention versus when they implement a packaged intensive intervention? Because there is still little information about successful implementation of intensive intervention beyond elementary school, it is also clear that researchers should further examine effective PD practices in the upper grades.

Conclusion

In this review, we shed light on the types of PD that researchers have provided for teachers who implement intensive interventions. In general, PD has consisted of 1- to 2-day training often followed by some type of ongoing support. *Duration* and *active learning* were commonly reported elements of PD. However, *coherence, collective participation*, and *content focus* appeared less frequently within the studies. More studies should incorporate these elements, and should describe and examine professional PD for implementing intensive reading interventions. Our hope is that, as research in this area continues to grow, educators will have the necessary tools and support to improve reading outcomes for students with the greatest needs.

Authors' Note

Second through fourth authors are listed alphabetically because of their significant and comparable contributions to this manuscript.

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Supplemental Material

Supplemental material for this article is available on the webpage with the online version of the article.

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*References of studies included in the systematic review are denoted with an *.*

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