

An Analysis of the Reading Mastery Program: Effective Components and Research Review

Abstract: This paper provides an analysis of the *Reading Mastery* program. This analysis includes three main sections. First, an overview of the need to teach reading is provided. Second, three focal areas (i.e., oral language, decoding, and comprehension) are discussed. How *Reading Mastery* aligns with these focal areas is examined. Finally, a comprehensive research review of 25 published studies and two large-scale research reviews are detailed. Twenty-one comparative studies were grouped according to population under investigation (i.e., general education [$n = 4$]; general education remedial readers [$n = 8$]; and special education [$n = 9$]). Four studies investigating *Reading Mastery* without comparison to other reading curricula were described. Study characteristics (i.e., program or program comparison, participants, research design, dependent variable(s), program effectiveness or most effective program, fidelity of implementation, maintenance/longitudinal data, and social validity data) were examined for each of the 25 investigations. Fourteen of the 21 studies (67%) favored *Reading Mastery/DISTAR Reading*, while other programs were favored in three studies (14%). Nine directions for future investigations of the effects of *Reading Mastery* are discussed.

This paper provides the first published review of the *Reading Mastery* program. As such, it provides an overview of the need to teach reading and examines three focal areas of effective reading instruction (i.e., oral language, decoding, and comprehension). Additionally, an examination of how *Reading Mastery* aligns with the research on effective skill development approaches in these areas is provided. A research review of studies using the *Reading Mastery* program was also conducted. Various components of the investigations were summarized. Finally, recommendations for future research on *Reading Mastery* are described.

Overview of the Need to Teach Reading

Learning to read in the elementary years is an essential stepping stone toward successful educational performance and advancement in our society. Yet the National Assessment of Educational Progress (2001) reported that 37% of fourth-grade students cannot even read at a basic level, and only 32% read at or above a proficient level, defined by the National Assessment Governing Board as the level all students should reach. Further, the National Institute of Child Health and Human Development (NICHD; 1996) noted that 40% of the overall school population has reading problems severe enough to hinder their reading enjoyment. According to the NICHD, the

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inability to decode single words is the most reliable indicator of a reading disorder. In addition, the NICHD noted that “phonological awareness appears to be the most prevalent linguistic deficit in disabled readers” (p. 36). Children who are classified as poor readers are characterized by their lack of phonemic awareness at the beginning of first grade (Juel, 1988). These same children have an 88% chance of being poor readers by the end of fourth grade. Hall and Moats (1999) noted that *how* reading is taught in schools is connected to the number of students who experience reading difficulty and the decline in reading scores.

Educators have seen a steady shift over the last decade in how best to teach reading. At the beginning of the 1990s the whole language approach was widely adopted in schools as the dominant model for teaching reading. With declining reading scores, the mid-1990s gave way to the more “balanced” approach of providing phonics instruction within a literature-based curriculum (Carnine, Silbert, & Kameenui, 1997). In 1997, Congress asked the NICHD to form a panel of respected professors, researchers, and educators in an effort to assess the research on reading instruction and to formulate recommendations for the most effective way to teach reading. This National Reading Panel (NRP), consisting of 14 individuals, drew upon approximately 15,000 scientific studies conducted prior to 1966 and another 100,000 between 1966 and 1998. The panel finalized their report in February of 1999 and offered these recommendations on components of effective reading instruction (Institute of Child Health and Human Development, 2000):

- Teach phonemic awareness explicitly.
- Provide systematically sequenced phonics instruction.
- Teach synthetic phonics where letters are converted into phonemes and then blended to form whole words.

- Use guided oral reading with appropriate error correction techniques and feedback strategies to facilitate reading fluency.
- Develop vocabulary and use systematic instruction to promote reading comprehension.

To ensure that the goal of reading acquisition is realized by all students, a reading program that incorporates these research-validated components is needed. *Reading Mastery* is one such program. *Reading Mastery* is a basal reading program with multiple levels (I–VI), an accelerated *Fast Cycle* program, and *Plus* (this level includes information from *Language for Learning*, *Reading Mastery I*, and *Reasoning and Writing*). *Reading Mastery* incorporates decoding, comprehension, literary, and study skills throughout all levels. Once skills are introduced they appear repeatedly in later lessons. This scope and sequence is intended to ensure mastery of skills taught through the progression of *Reading Mastery*.

Focal Areas of Effective Reading Instruction

Three primary focal areas are needed for children to become effective readers. These areas include oral language, decoding, and comprehension.

Oral Language: A Reading Prerequisite

Oral language skills are critical prerequisites for successful reading. In fact, Polloway, Patton, and Serna (2001) noted that language development is linked to success in and out of school and is a key area of intervention in homes, schools, and communities. Oral language can be divided into two components: receptive and expressive. Receptive language refers to words that are recognized or understood. This type of language often is measured by orally presenting a word and asking the student to identify the corresponding object (e.g.,

“Touch your nose”). Expressive language refers to the words that are produced by students. To measure oral expressive language students are commonly asked to state the appropriate word for presented objects (e.g., point to a picture of a dog and ask, “What is this?”). Thus, “these oral language skills, both receptive and expressive, play a vital role in student’s progress through school” (Meese, 2001, p. 256).

Good readers have been shown to differ from poor readers in the speed and accuracy with which they can orally identify (both receptively and expressively) colors, numbers, and objects, as well as letters (Catts, 1991; Olofsson & Niedersoe, 1999; Scarborough, 1991; Walker, Greenwood, Hart, & Carta, 1994). Further, Meese (2001) noted that expressive vocabulary, naming skills, and letter identification were associated with a child’s future reading skill. This research suggests that oral language skills are important to the development of reading. Interestingly, Meese (2001) and Snyder and Downey (1997) noted the relationship between language development and reading disabilities. Although the relationship was unclear, they speculated that difficulty with such oral language components as syntax (word order), phonology (sounds), and semantics (vocabulary for labeling objects and concepts) may hinder the reading skills of students.

Moats (2001) investigated factors related to beginning reading achievement by following 800 kindergarten and first-grade children from classrooms in nine low performing schools through the third and fourth grades. Moats found that as children with deficiencies in vocabulary and comprehension progress from grade to grade, the gap in their language skills seems to increase and greatly affects their reading performance. Although they may be able to understand the basics of primary text in kindergarten and first grade, by the fourth grade these students are lost in the more complex text they encounter in school. Moats described this phe-

nomenon as the increasing “language gap.” The author concluded that direct language teaching that includes instruction in phoneme awareness and the experience of language simulation throughout the school day is necessary for children with linguistic differences.

Research has shown that early reading is based largely on good oral language skills (Snow,

Technical note:

Develop strong oral language skills

High oral language skills are important for early and fluent reading. Progress in learning to read requires successful integration of oral language comprehension with specific literacy skills so that students can incorporate new words into their knowledge base. For students who are mature readers, oral language comprehension is the strongest predictor of written language comprehension (Dale & Crain-Thoreson, 1999).

Snow et al. (1998) summarized several language skills studies that found high correlations between early preschool language and reading skill 3 to 5 years later.

Senéchal (1997) found that repeated readings of a story (a receptive language activity) were associated with greater gains in oral language for prekindergarten children.

Hart and Risley (1995) examined the language skills of 1- to 2-year-old children from 42 families (high, middle, and low SES) for 2.5 years. They found striking differences in later vocabulary growth rate, vocabulary use, and IQ test scores with higher vocabulary rates and IQ scores noted for children who came from higher SES backgrounds. These skills were noted to be critical measures of an individual’s ability to succeed at school and in the workplace.

Kuder (1991) found that students with better language skills such as word discrimination and sentence imitation, consistently demonstrated better reading gains than their peers with poorer language skills.

Burns, & Griffin, 1998). Recognizing that oral language skills are a necessary prerequisite to learning to read, *Reading Mastery* addresses oral language development in prereading activities. Specifically, *Reading Mastery Plus* combines the skills taught in a language program, *Language for Learning*, with *Reading Mastery I* and a writing curriculum, *Reasoning and Writing*. *Reading Mastery Plus* provides instruction on grammar, listening skills, and vocabulary in addition to decoding and comprehension skills. This program provides the additional instruction in oral language skills needed for students who may be struggling with reading acquisition due to language deficits.

Decoding: Learning to Read

Decoding, or translating language from printed text, is best taught using a program that explicitly teaches phonemic awareness, phonics, and blending (NICHD, 1996; NRP, 2000; Snow et al., 1998). This approach is referred to as a code-emphasis approach. By contrast, a meaning-emphasis approach, (e.g., whole language) relies on contextual cues such as pictures and story themes, and structural cues such as word types including nouns or verbs as a means of teaching reading. Research continues to demonstrate the superiority of a code-emphasis program in the acquisition of beginning reading skills (Carnine et al., 1997; Foorman, 1995; Salerno, 1992).

Technical note:

Focused instruction in phonics is superior to a nonphonics approach

Students should decode words by attending to their letter-sound relationships. Context and picture cues should only be used as a secondary tool in word recognition (Snow et al., 1998).

Students receiving direct instruction in the alphabetic principle increased their word-reading skills at a significantly faster rate than students who were taught the alphabetic principle indirectly through exposure to literature (Foorman, Francis, Fletcher, Schatschneider, & Mehta, 1998).

Years of research have consistently found that good readers do not rely on context and prediction for word recognition. Further, students need explicit instruction in alphabetic coding as some students in whole language classrooms do not acquire the alphabetic principle through immersion in print and writing activities (Stanovich, 1994).

Juel and Minden-Cupp (2000) analyzed word recognition instruction in 4 first-grade classrooms. Classroom 1 had virtually no phonics or phonemic awareness instruction. Word recognition in this classroom consisted of a "word wall" exercise where new words were introduced in front of the entire class at the onset of language arts instruction. Blending and sounding-out were never modeled. Classroom 2 made use of little books containing poems to teach word recognition. The class was divided into three groups, all of which received some (20%–38% of the time) phonics instruction. Classroom 3 used numerous books, poetry, writing, and discussion of texts. Little systematic phonics instruction existed; however, the teacher capitalized on an opportunity to teach phonics when a new word was presented in a book or poem. Peer coaching techniques were used for word recognition in reading groups. Classroom 4 used a systematic phonics approach. The class was divided into three groups. The lowest group received more phonics and phonemic awareness training while the highest group spent a higher percentage of their time reading texts. Toward the end of the year, more focus on vocabulary and text discussion was noted. Reading results at the end of the year demonstrated the phonics approach was superior. Students in Classroom 4 were reading at a late-second grade level; students in Classroom 3 were reading at a mid-second grade level; students in Classroom 2 were reading at the end-of-the-first grade level, and students in Classroom 1 were reading at the primer level.

When students are learning how to read, three essential components should be taught in an explicit manner. First, students should be taught that words are comprised of a sequence of isolated sounds or phonemes. This step is commonly referred to as the acquisition of phonemic awareness. Second, students must learn the sounds that correspond to individual and combinations of letters (phonics). The final step in beginning reading acquisition is the blending of these individual sounds to form meaningful whole words that are said fast so they form real words (e.g., mmmmaannn = man). In explicit instruction, teachers provide clear modeling and guided practice to students, thereby demonstrating exactly what students must know. In implicit instruction teachers do not directly state the relationships between what is being taught and what students should know, but rather assume the students will naturally arrive at the desired outcomes based on their own unique interactions with the reading immersion process.

Phonemic Awareness Skills Must Be Taught Explicitly

Numerous researchers have shown a consistent link between phonemic awareness skills and reading acquisition (Cunningham, 1990; Foorman et al., 1998; McGuinness, McGuinness, & Donohue, 1995; Smith et al., 2001; Torgesen, Morgan, & Davis, 1992; Troia, 1999; Vandervelden & Siegel, 1997). Phonemic awareness skills include perceiving words as a sequence of various sounds, isolating and segmenting individual phonemes, blending phonemes into whole words, and rhyming. Snow et al. (1998) concluded that good phonemic awareness skills are the most successful predictor of future superior reading performance. These skills are not natural for most students; therefore, they must be taught in an explicit manner. The importance of these skills is recognized through the early emphasis in *Reading Mastery* on phonemic awareness training. The following is a sample

lesson on phonemic awareness taken from *Reading Mastery I*:

Teacher: "Listen. Ham-burg-er. Say it fast."
Hamburger.

Then later the task becomes more focused on blending phonemes:

Teacher: "Listen. sss-lll-aaa-mmm. Say it fast."
Slam.

These phonemic awareness skills are an essential precursor to decoding new and unfamiliar words.

Technical note: Teach phonemic awareness explicitly

Compelling evidence shows that explicit training in phonemic awareness is invaluable toward the goal of efficient and effective reading instruction. Further, the key to acquisition of phonemic awareness involves explicit instruction rather than age or natural development (Adams, 1990; Snow et al., 1998).

"First grade instruction should be designed to provide explicit instruction and practice with sound structures that lead to phonemic awareness" (Snow et al., 1998, p. 194).

According to the Institute of Child Health and Human Development (2000), the research to date strongly supports the concept that explicitly and systematically teaching children to manipulate phonemes significantly improves children's reading and spelling skills. One study by Davidson and Jenkins (1994) found that students taught both segmenting and blending skills showed significant transfer to word-reading and spelling tasks. A similar conclusion that decoding requires both the skill to segment and blend phonemes, plus some skill to manipulate phonemes was reached by Lenchner, Gerber, and Routh (1990).

Several instructional design features were among those recommended for phonemic awareness
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interventions. These include: explicit instruction in blending and segmenting as auditory tasks, particularly at the phoneme level; systematically sequencing tasks; increasing opportunities to produce sounds at the phoneme level; and providing explicit instruction to increase the conspicuousness of strategies that allow children to perceive phonemes. These features are accomplished directly by teacher modeling of specific sounds, having students produce specific sounds, and having students form mental manipulations of sounds given a concrete representation (Smith et al., 2001).

In a study involving 84 kindergarten and first-grade children, Cunningham (1990) found that explicit instruction in phonemic awareness was superior to implicit instruction in helping children apply the components of phonemic awareness to the actual act of reading.

Children who were taught explicit manipulation of sounds demonstrated significantly higher phonemic awareness skills than children who were not taught sound manipulation (Wise, Ring, & Olson, 1999).

Children who do not demonstrate phonemic awareness are unable to decode words with accuracy and fluency (i.e., the distinguishing characteristics of persons with reading difficulties). Further, phonemic awareness skills should be taught explicitly at an early age (NICHD, 1996).

Letter–Sound Correspondence Must Be Taught Explicitly

In *Reading Mastery*, letter–sound correspondence is introduced before letter–name correspondence. Focusing on letter–sound correspondence has been shown to facilitate blending, thereby accelerating reading acquisition. This emphasis on letter–sound correspondence results in more efficient reading instruction (NICHD, 1996). Letter–name instruction is not introduced until *Reading Mastery II*. Explicit instruction in teaching letter–sound

correspondence looks like this in *Reading Mastery*.

Write *m* on the blackboard. Point to *m*. “This sound is mmm. What sound?”

(Students say the sound, “mmm”).

By contrast, implicit instruction is ambiguous and requires students to draw their own conclusions.

Forty letter–sound correspondences are taught in *Reading Mastery*. The letter–sounds (e.g., *c* = /k/, *s* = /sss/) and letter–sound combinations (e.g., *qu* = /koo/, *er* = /er/) are taught in isolation based on high utility and frequency in print. Only the most common sounds for each letter or letter combination are taught initially. Letters that look and/or sound similar are separated and sequenced carefully to decrease confusion (e.g., *b* and *d* are separated by 94 lessons).

Reading Mastery aligns decodable text by presenting only the letter–sound correspondences already taught in previous lessons.

Letter–sound correspondences are carefully sequenced to allow for meaningful words and stories to appear in print as soon as possible. For example, by lesson 80 of *Reading Mastery I* and lesson 40 of *Fast Cycle I/II*, students are reading a series of meaningful sentences that contain words with both long and short vowel sounds. Decodable text provides students an avenue to practice their new knowledge of letter–sound relationships in the context of real reading. Less decodable text requires students to guess, predict, or use contextual cues to figure out words. These strategies have been shown to be ineffective and inefficient (NICHD, 1996).

Reading Mastery incorporates the use of specialized orthography. Some letters are connected (e.g., *sh*, *wh*, *qu*, *th*) to prompt only one sound, while others have lines over them to signal a specific pronunciation (e.g., *ing* and

vowels). Letters that are present in words but are not heard are printed in a smaller font (e.g., the e on CVCe words). The *Reading Mastery* orthography reduces the number of letter–sound correspondences that students must learn initially, allowing for more decodable sounds to be used earlier in meaningful and interesting stories. This orthography is faded in *Reading Mastery I* and is completely eliminated in *Reading Mastery II*.

Reading Mastery does not incorporate the use of capital letters initially in the program. Capital letters are less often seen in everyday print, making them a lower priority for beginning instruction of letter–sound relationships. Letters with visually similar upper and lower-case counterparts (e.g., Ss, Cc, and Pp) are introduced at the same time. The capital letters that are not visually similar to their lower-case counterparts (e.g., Gg, Rr, and Aa) are not

introduced until later, once mastery has been reached on the lower-case letters.

Blending Must Be Taught Explicitly

Once phonemic awareness skills and letter–sound correspondences have been taught, a final component in beginning reading acquisition is sounding-out or blending. Decoding unfamiliar words requires the blending of letter–sound correspondences into meaningful whole words. Readers approximate the word by sounding-out its phonemes and then match that approximation to a real word from their oral vocabulary that fits the context of the passage. A recommendation for beginning reading instruction from the NICHD (1996) suggests teaching students to blend sounds together by moving left to right, saying the sounds for each letter. Words composed only of the letter–sound relationships that students already have learned should be included in this practice.

Technical note: Teach letter–sound correspondences explicitly

An optimal reading program is one that teaches phonemic awareness skills such as segmentation and blending in combination with letter–sound correspondence (Ball & Blachman, 1991; Byrne & Fielding-Barnsley, 1991; Murray, 1998; Spector, 1995; Stanovich, 1994).

Studies have consistently shown that programs incorporating systematic instruction on letter–sound correspondence promote higher achievement in both word recognition and spelling in early grades and for children who are lower performers or are from lower socioeconomic status groups (Adams, 1990).

The NICHD (1996) reported that all phonics instructional methods were not equal. Explicit instruction in which letter–sound correspondences were taught in isolation (e.g., “This letter says /sss/”), not in the context of words or stories (e.g., “Sun starts with an s”), was most effective.

According to the Institute of Child Health and Human Development (2000) the greatest improvements in reading were seen from a program that combined systematic (i.e., carefully sequenced) and synthetic (explicit conversion of letters into sounds and then blended into whole words) phonics. These gains were noted for typical and high achievers as well as lower achievers and students with learning disabilities.

Students who receive explicit training in letter–sound correspondence were more accurate on word recognition tests consisting of regular and irregular words than students who received whole word training or no training (Haskell, Foorman, & Swank, 1992).

Students with more letter–sound instruction demonstrated a significant increase in accurate reading rate of both regular and irregular words over students with less instruction in letter–sound correspondence (Foorman, Francis, Novy, & Liberman, 1991).

In *Reading Mastery*, teachers model the blending skill, then students repeat the process. Letters are blended together without stopping between the sounds; referred to as the “Engelmann Blending Strategy” (Hastings, Tangel, Bader, & Billups, 1995). The blending strategy is initiated once students have learned the first two sounds presented in the program.

Additional Design Features

Many other research-validated features are incorporated in *Reading Mastery*. These include accuracy and fluency instruction, specific and immediate feedback and error corrections, and an appropriate placement within the program. Accuracy and fluency instruction is intended to develop proficient readers who can focus their attention to the comprehension of text. Specific feedback and error corrections are incorporated to help promote accuracy in

decoding during oral reading. Finally, providing an appropriate placement within the series should enable students to be both challenged and successful with their reading curriculum.

Build accuracy and fluency. Accuracy is the skill to identify sounds and words correctly while reading fluency is the skill to read text with ease, efficiency, and expression. Students must first be accurate decoders before fluency can become the focus of instruction. As readers become more fluent, decoding becomes more automatic, with less time and effort required for word recognition (Carnine et al., 1997; Levy, Nicholls, & Kohen, 1993).

Comprehension is associated with faster reading rates (Lane & Mercer, 1999; Mastropieri, Leinart, & Scruggs, 1999; Reutzel & Hollingsworth, 1993; Slocum, Street, &

Technical note: Teach blending explicitly

An analysis of first-grade reading programs showed only 20% of basal reading programs included explicit blending instruction at high levels, and an additional 10% included this instruction at minimal levels (Snow et al., 1998).

A study by Weisberg and Savard (1993) demonstrated that students who were taught to blend words without pausing between the sounds (e.g., mmmaaaannn) led to word recognition, whereas pausing between the sounds (e.g., mmm/aaa/nnn) did not lead to word recognition. The letter-sound correspondences and other prerequisite skills such as reading left to right were explicitly taught to all students in the same manner. Groups were then divided into a 1-second pause interval and a 0-second pause interval between sounds. All children could produce the sounds for each letter with equal accuracy. However, this did not lead to word recognition for the students in the 1-second pause interval group.

Once students learn the precursory strategy skills of letter-sound correspondence, sounding-out, and blending, these strategies can be generalized to activities that require decoding of unfamiliar words (Stein, Carnine, & Dixon, 1998). By contrast, when students learn specific sight words, they do not have a strategy to apply to other words that have not previously been encountered.

Teaching students a strategy to identify new words was very successful in a study by Walton, Walton, and Felton (2001). First-grade students with weak prereading skills were taught a strategy where they sounded-out and blended individual letters to form words. These students caught up to their higher performing peers in word reading and maintained these results 4 months later.

Phonemic segmentation and blending skills have been found to differentiate successful and unsuccessful readers. In addition, students who received extra attention in the act of blending were found to make superior gains on beginning reading achievement tests (Taylor, Harris, Pearson, & Garcia, 1995).

Gilberts, 1995). With automaticity in decoding, readers are able to attend more to the meaning of text. Recent recommendations from the Institute of Child Health and Human Development (2000) and Snow et al. (1998) emphasize the importance of developing and achieving fluency. Despite these recommendations, a survey of first-grade basal reading programs showed only 40% of the programs provided activities at high levels specifically labeled as opportunities to build reading fluency (Snow et al.).

Reading Mastery includes techniques to develop accurate and fluent oral reading through the use of repeated readings and partner readings. In early levels, the stories are first read by students to work on decoding skills and then again to answer comprehension ques-

tions. If students make a decoding error, they are asked to return to the beginning of the sentence and read it again allowing extra practice toward the goals of accurate and fluent decoding through repeated readings. Partner readings involve students reading the daily passage to each other prior to rate-and-accuracy checkouts with the teacher or completing independent seatwork.

Provide specific and immediate feedback on oral reading errors. Although Reading Mastery incorporates the use of silent reading throughout all levels during independent student activities, the primary focus remains on guided oral reading. Carnine et al. (1997) noted that when students are learning new, complex material, immediate feedback is preferred. Student oral reading allows educators to identify errors effectively

Technical note: Build accuracy and fluency

Neely (1995) compared the effects of whole language, precision teaching, and *Reading Mastery* on the fluency achievement of first-grade students over 3 years. First graders in Years 1 and 2 were taught via the whole language approach of Silver Burdett-Ginn World of Reading Series. The Year 3 first graders were taught using the combination of precision teaching and *Reading Mastery*. This latter group demonstrated a fluency rate of 1.8 and 2.0 times faster than Year 1 and 2 students, respectively. Neely concluded that a combination of precision teaching and *Reading Mastery* was superior to whole language in facilitating reading fluency.

"If fluency building is not emphasized, students may remain disfluent readers indefinitely" (Carnine et al., 1997, p. 226). Carnine et al. cited two studies (Sindelar, Monda, & O'Shea, 1990; Weinstein & Cooke, 1992) demonstrating positive effects of repeated readings on student reading fluency. Those findings suggest that multiple readings of story passages would benefit all types of students in the classroom. In addition, Mastropieri et al. (1999) found that repeated readings of text enhanced fluency.

Fluency is one of several critical factors necessary for comprehension of text. If decoding is laborious and inefficient, it will be difficult for students to remember what they are reading. In general, reading practice is recognized as a contributing factor to fluency acquisition. The Institute of Child Health and Human Development (2000) named two variations of practice to be used in instruction: (a) oral reading with systematic and explicit guidance and feedback from the teacher, and (b) silent reading which encourages students to read on their own out of the classroom setting.

Aside from repeated readings, timed readings also can enhance reading rate. Short 100–300 word passages should be read and timed with a graph marking the results and progress in words per minute. These passages should not be above a student's instructional level (i.e., the highest level at which a student can read with few errors and satisfactory comprehension) so that decoding is not a struggle (Taylor et al., 1995).

and efficiently, and to provide appropriate feedback or correction procedures. Providing specific and immediate feedback to students during guided oral reading enables them to read more accurately and consequently facilitates comprehension of text (Institute of Child Health and Human Development, 2000).

In *Reading Mastery*, every error is corrected. These corrections are directed to all students, even if only one student makes the error. Error correction procedures in *Reading Mastery* are specific to the error. For example, the following is the correction procedure for a word identification error:

For *Reading Mastery I*:

“That word is ____.”

“Everybody, sound it out. Get ready.” (Loop under the letters.)

“What word?” “Yes, ____.”

“Starting over.” (at the beginning of the sentence or column)

Provide a delayed test for the individual student who made the error.

For *Reading Mastery II–VI* (after lesson 90 in Level II)

“That word is ____.”

“What word?”

“Spell ____.”

“What word did you spell?”

“Starting over.” (at the beginning of the sentence)

Provide appropriate placement and regular assessment of progress. To ensure appropriate placement in the program, Reading Mastery contains a placement test in every level that should be given to all students at the beginning of each school year. These placement tests provide information about the appropriate level and

Technical note: Provide immediate feedback on errors

Heubusch and Lloyd (1998) analyzed 24 studies of error correction procedures completed from 1979–1994. Their analysis yielded a strong recommendation for the use of correction procedures during oral reading. Although one particular correction procedure was not found to be superior, they offered the following guidelines:

1. The appropriate technique depends on the reading goal. If fluent, accurate reading is the goal, word supply (i.e., teacher provides the correct word) should be used. If letter–sound correspondence is being learned, or if time for practice exists, a phonetic emphasis correction (i.e., sounding-it-out) should be used.
2. The timing of corrective feedback should be immediate and direct.
3. Correction procedures should require an active, correct response by the student.
4. Interruptions during the reading process do not hinder comprehension.

Pany and McCoy (1988) studied the effects of providing feedback on every oral reading error, providing feedback only on errors that changed the meaning of the text, and no feedback on any errors. They found that when corrective feedback was given after every oral error, students made significantly fewer overall errors, fewer errors that changed the meaning of passage reading, fewer errors in word lists, and fewer errors on comprehension questions. In addition, only when corrective feedback was given after every oral error did students demonstrate a further reduction of errors on delayed tests.

lesson for each student to begin at as well as guidelines for grouping students.

In addition to the placement tests, *Reading Mastery* is designed so that students are continually tested through rate-and-accuracy checkouts. In these checkouts, students are timed and errors are recorded on specific passages. These checkouts along with independent work are used to identify students who need remediation.

Finally, mastery tests within the program are administered after every 20th lesson. Items on the mastery tests correspond with specific skills taught in *Reading Mastery*. Remedial exercises are provided for students who do not perform well on either the rate-and-accuracy checkouts or the mastery tests.

Comprehension: Reading to Learn

Comprehension, or gaining meaning from text, is the ultimate goal of learning to read. As students become accurate and fluent decoders, reading comprehension becomes the major

focus of instruction (i.e., reading to learn). Reading to learn means that students can move beyond the task of decoding to making sense of written text, particularly in expository materials such as content area textbooks and reference books designed to convey factual information (Carnine et al., 1997). Research indicates that comprehension is taught most effectively through systematic and explicit instruction (Institute of Child Health and Human Development, 2000). Consistent with the recommendations of the NRP, *Reading Mastery* places a strong emphasis on comprehension through a variety of explicit teaching strategies beginning in the early levels of instruction. Comprehension should be taught in the same systematic and carefully sequenced manner as was highlighted for instruction in decoding (Carnine et al.). Further, an effective comprehension program should include:

- systematic introduction of vocabulary, taught prior to encountering the words in passage reading;
- information needed to make inferences and comprehend the passage taught prior to

Technical note: Provide appropriate placement and regular assessment of progress

Recommendations from Snow et al. (1998) for Grades 1–3 state: “because the ability to obtain meaning from print depends so strongly on the development of word recognition accuracy and reading fluency, both of the latter should be regularly assessed in the classroom, permitting timely and effective instructional response when difficulty or delay is apparent” (p. 323).

Students should be tested to find their instructional level for reading. An independent level is deemed too easy and a frustration level too hard. A student should be reading with 95% decoding and 75% comprehension accuracy to be placed at an instructional level (Taylor et al., 1995). According to Moody, Vaughn, Hughes, and Fischer (2000), the idea of providing material at the instructional level of the student is fundamental to the basic understanding about teaching and learning.

Carnine et al. (1997) suggest testing at the beginning of each year using criterion-referenced tests that evaluate specific skills taught in the program being used, or those skills that are deemed important in general. Further, they recommend using the results of this type of testing to determine placement for students within the program.

the passage reading in which the information is required;

- systematic, structured presentation of strategies for comprehension with examples/nonexamples and opportunities for extended practice and review;
- specific comprehension skills integrated into passage reading so that the teacher may guide the students in the acquisition of the overall meaning of the text (Carnine et al.).

Several strategies for reading comprehension have been validated by research studies in the areas of vocabulary development, text comprehension, teacher preparation, and comprehension strategy instruction (e.g., question

answering, summarization) (Institute of Child Health and Human Development, 2000).

From beginning lessons, *Reading Mastery* incorporates a wide variety of these comprehension strategies and presents them systematically in four important areas: vocabulary, literal comprehension, interpretive comprehension, and reasoning (Osborn, 1995). Further, *Reading Mastery* also provides instruction in the comprehension of expository text used in academic content areas (e.g., social studies, science).

Reading Mastery teaches comprehension by: (a) preteaching new vocabulary explicitly, (b) teaching literal comprehension strategies explicitly, (c) teaching interpretive comprehension strategies explicitly, and (d) teaching reasoning skills explicitly.

Technical note: Preteach new vocabulary explicitly

Knowledge of word meanings is an important aspect of comprehension. Vocabulary knowledge is correlated with comprehension skill and likewise, comprehension is diminished by lack of word knowledge. The greatest gains in vocabulary have been noted when passages contained explicitly taught words. In addition, methods providing both word definitions and examples of word usage in a variety of contexts produced the greatest gains in both vocabulary and reading comprehension (Adams, 1990; Snow et al., 1998).

Fourth-grade students given instruction on target words while hearing a story had significantly greater vocabulary gains than students who did not receive instruction on the target words. These gains were still present 6 weeks later in delayed testing (Brett, Rothlein, & Hurley, 1996).

Students were taught new vocabulary words by two approaches: instruction in isolated word meanings with low, medium, and high levels of practice, and instruction in deriving word meanings from context. All levels of practice in isolated meaning instruction demonstrated more gains in vocabulary growth with high levels of practice being the most significant. Instruction in deriving meaning from context was more successful in the skill of learning other unfamiliar words independently. However, this skill was dependent on a student's existing vocabulary (Jenkins, Matlock, & Slocum, 1989).

A number of studies have investigated the hypothesis that readers learn vocabulary incidentally by deriving word meaning from context during everyday reading. The results of one such study showed that incidental learning of new words is a very slow process that shows appreciable gains only after numerous years of reading (Fukkink & deGlopper, 1998).

Both average and high skilled students benefited from instruction of text-specific vocabulary prior to reading expository texts. These students were able to make causal connections within the text after vocabulary instruction (Medo & Ryder, 1993). Further, acquisition and retention of content text material was shown to be significantly increased when students were pretaught vocabulary in a study by Carney, Anderson, Blackburn, and Blessing (1984).

Preteach New Vocabulary Explicitly

The Institute of Child Health and Human Development (2000) concluded that it is beneficial for vocabulary development to be directly taught first in isolation, then later within the context of reading passages as the words are encountered. However, the NRP emphasized the use of multiple strategies (e.g., computer assisted instruction, encountering words in a variety of contexts, indirect learning of new vocabulary in the context of stories) with numerous repetitions and frequent exposures, rather than one single method of vocabulary instruction. Consistent with these recommendations, *Reading Mastery* uses a variety of strategies to teach vocabulary. Some words require the use of examples/nonexamples when the words in the definition are not easily explained or understood (e.g., shapes: when teaching oval, present ovals in various sizes and contexts versus circles, squares, etc.). Other words can be taught using synonyms when an easier, equivalent word exists within a student's vocabulary (e.g., ancient: old). The use of definitions is necessary for more complex words that require a lengthy explanation of the word (e.g., intervene: to come between two things). After vocabulary words are taught in isolation, these same words then appear in reading passages. *Reading Mastery* also provides opportunities to use the words through sentences that model appropriate use of the word. These sentences are practiced extensively over time until mastery of the new word has been attained. As general knowledge of vocabulary grows, stories become increasingly more complex and interesting. Thus, initial focus in reading is on controlled vocabulary and content which fades to high interest stories as gains are made in reading vocabulary (Carnine et al., 1997).

Teach Literal Comprehension Strategies Explicitly

Literal comprehension is the simplest, most direct form of comprehension (Carnine et al., 1997). This type of comprehension involves

literal questions or statements directly expressed in passages. Although many students master this skill naturally, others must receive guidance to understand the literal meaning of text. In early levels of *Reading Mastery*, students are provided frequent opportunities to practice strategies at the literal level (e.g., answering who, when, where questions). Teachers model the strategy, and students then repeat it. As students become independent with each task, the amount of teacher assistance is reduced.

Students are taught the following literal comprehension strategies in *Reading Mastery* through explicit and systematic instruction: following written directions, answering literal questions about text, identifying literal cause and effect, memorizing facts and rules, recalling details and events, and sequencing narrative events (Osborn, 1995).

The answers to literal questions are directly stated in the passage. In early levels of *Reading Mastery*, interspersed questions are used (i.e., students read sentences followed by questions about what was read). This placement of questions is intended to demonstrate to students how good readers think about what they are reading as they read. Specific questions and placement of such questions are provided in each teacher presentation book.

In *Reading Mastery*, students are initially taught to order a series of events using passages that contain a small number of events presented in the exact sequence to be identified. Students are explicitly taught to underline and label each event as it occurs. As students become proficient, guidance is faded and longer, more complex passages are presented.

Finally, although adequate opportunities for students to master literal comprehension are provided, *Reading Mastery* quickly moves into more challenging passages where students are required to make inferences from what is being read.

Technical note: Teach literal comprehension strategies explicitly

Text comprehension through explicit and formal instruction of strategies leads to improvement in reading comprehension. Instruction is best when modeled and guided by the teacher. Instruction on the strategy of literal question answering leads to an improvement in both finding answers and answering questions after reading passages (Institute of Child Health and Human Development, 2000).

Pressley (1998) reviewed the instruction of comprehension in the educational setting and concluded that comprehension tasks given to students in the classroom seemed to be informed by the research conducted over the past 20 years. This was demonstrated by students being asked to complete short answer questions, construct questions pertaining to their reading, predict outcomes of a story, and identify confusing points. In general it was found that students were provided opportunities to practice these strategies but were not actually taught the strategies themselves or the value of learning and applying these strategies.

Moody et al. (2000) found the same lack of comprehension strategy instruction in programs for students who were low performing and who had learning disabilities. Despite what is known about the effectiveness of comprehension strategy training, the only comprehension activities they noted consisted of the teacher asking the students literal questions about stories they had read.

In addition to assessing general comprehension, teachers must consider students' literal and inferential comprehension as well. Specific instruction to remedy poor literal comprehension can be done by teaching the student to look back in the passage and find the answer that is directly stated. Both narrative and expository texts written at the instructional level of the students should be used (Taylor et al., 1995).

Teach Interpretive Comprehension Strategies Explicitly

Stories in later levels of *Reading Mastery* rely on the background knowledge of the reader which requires them to move beyond simple literal comprehension strategies. Interpretive comprehension in *Reading Mastery* includes: outlining, predicting outcomes, inferring details and events, making comparisons, inferring cause and effect, inferring morals, inferring main ideas, and summarizing (Osborn, 1995). Strategies for these components are explicitly taught.

For example, when first learning to infer the main idea from a passage, the teacher models an example:

Tina put the pencil into the sharpener.

Then Tina turned the handle.

Tina pulled the pencil out of the sharpener.

The main idea is "Tina sharpened the pencil."

The students are then asked to infer the main idea of a similar passage:

Roses grow in the summer.

Pansies grow in the summer.

Buttercups grow in the summer.

Students respond, "Flowers grow in the summer."

Passages become increasingly longer and more difficult.

Similarly, the systematic guidance for learning to outline is carefully provided. At first, students are given an outline from a passage they have read. They extrapolate a few main points or supporting details and fill them in. Next, students may be given a broad outline with only the main ideas. They must then fill in

several supporting details for each main idea. Later, students are required to complete an entire outline, initially for single paragraphs, but ultimately, entire passages.

Teach Reasoning Skills Explicitly

As students' vocabulary and comprehension skills grow, more sophisticated concepts are taught in *Reading Mastery*. Multiple strategies are introduced in later levels of *Reading Mastery* to further enhance reading comprehension. These concepts emphasize the skill to analyze the underlying logic of text and include: written deductions, drawing conclusions, identification of relevant evidence, rules to predict

outcomes, identification of faulty logic and contradictions, irony, and recognition of figurative language (Osborn, 1995).

The skill to make inferences from text is imperative for good reading comprehension skills (Carnine et al., 1997). One type of inference exercise in *Reading Mastery* involves instruction in deductive logic. Early examples are explicitly stated:

“When you use evidence to draw a conclusion,

You are completing a deduction. What are you doing?”

(Students say: “Completing a deduction.”)

Technical note: Teach interpretive comprehension strategies explicitly

“Throughout the early grades, reading curricula should include explicit instruction on strategies such as summarizing the main idea, predicting events and outcomes of upcoming text, drawing inferences, and monitoring for coherence and misunderstandings. This instruction can take place while adults read to students or when students read themselves” (Snow et al., 1998, p. 323).

Among the most promising and effective instruction recommendations from the Institute of Child Health and Human Development (2000) in the area of comprehension are: summarizing the main ideas; answering questions directed by the teacher with feedback on the correctness of the answer; asking who, what, where, when, and why questions which helps map out timelines, characters, and events; using graphic and semantic organizers which represent graphically the meanings and relationships of ideas; and multiple strategy teaching (using several of these listed procedures in coordination with teacher interaction).

An analysis of 16 quantitative research studies investigating reciprocal teaching of cognitive strategies for comprehension was conducted by Rosenshine and Meister (1994). Reciprocal teaching was defined as teaching students specific, concrete comprehension-fostering strategies through guided dialogue between teacher and students. Most of the studies evaluated strategies for summarization, question generation, clarification, and prediction. The study concluded that results were most successful when the strategies were explicitly and directly taught in isolation prior to reciprocal teaching. These results were significant in six of the seven studies that addressed prior explicit teaching of strategies with a median effect size of .88 when experimenter-developed comprehension texts were used.

Research suggests that analogies (comparisons) can be used to enhance comprehension if care is taken to prompt the reader to notice the relationship or “fit” between the two sets of information (Catrambone & Holyoak, 1989).

Instruction in analogies facilitates reading comprehension, vocabulary development, and the connection of ideas across curriculum. When analogy instruction was introduced to second graders through modeling the reasoning involved with making an analogy, increases in the above were noted (HuffBenkoski & Greenwood, 1995).

“Here is the evidence:

Every bird has feathers.

A heron is a bird.

What is the conclusion about a heron?”

(Students say: “A heron has feathers.”)

“Listen to the whole deduction:

Every bird has feathers.

A heron is a bird.

Therefore, a heron has feathers.

Everybody, say the whole deduction.”

This example is followed by others for students to complete. As students master deductive reasoning, the examples become more ambiguous.

Students learn to identify contradictions in a similar manner:

Technical note: Teach reasoning skills explicitly

A third-grade student should be able to accomplish the following comprehension goals: interpret fiction by discussing the underlying theme or message; interpret nonfiction by distinguishing cause and effect, fact and opinion, main idea, and supporting details; use information and reasoning to examine bases of hypotheses and opinions; and incorporate literacy words and language patterns in own writing (e.g., elaborates descriptions, uses figurative wording) (Snow et al., 1998).

Research has documented in all populations that the most common error in reasoning is the formation of a conclusion without sufficient evidence (Grossen, 1991; Grossen & Carnine, 1990). Direct Instruction in logical reasoning can have a positive impact on these error patterns (Grossen & Carnine, 1990). These effects generalize to other critical thinking and reasoning activities (Grossen, 1991).

Assume this statement is true: *Libby loved all vehicles.*

Then this statement is a contradiction: *Libby hated motor scooters.* Fill in the blanks to tell why the statements is a contradiction. If _____, then _____.

Once students understand the if-then relationship of a contradiction, further examples are presented in longer passages within the text.

Both narrative and expository text exhibit complex language and ideas that can be difficult to understand. The wide array of strategies that *Reading Mastery* encompasses are meant to facilitate the comprehension of such texts.

Conclusion

Research has clearly identified a variety of skills (i.e., oral language, phonemic awareness, letter-sound correspondence, blending,) as being critical to beginning reading instruction. Additionally, research suggested that these skills are best learned when taught in an explicit fashion. The previous section has outlined the ways that *Reading Mastery* teaches these necessary skills in an explicit manner. Through the use of prereading activities (i.e., preteaching vocabulary explicitly), specific teaching formats, decodable text, specialized orthography, accuracy and fluency instruction, specific and immediate feedback and error corrections, and an appropriate placement within the program, *Reading Mastery* ensures that students are taught critical skills for successful beginning reading.

Research on the Reading Mastery Program

The following sections summarize the published research literature on the *Reading Mastery* program. In addition to research articles, two large-scale research reviews related

to the *Reading Mastery* program (i.e., a Direct Instruction meta-analysis and Whole-School Reform Model Research) are included in this research summary.

Direct Instruction Meta-Analysis

A meta-analysis (review and summarization of a large number of studies) was conducted by Adams and Engelmann (1996) summarizing the research on *Reading Mastery* and other Direct Instruction programs. Thirty-seven research articles met the inclusion criteria for this meta-analysis. Thirty-four of the 37 studies involved active intervention of Direct Instruction curricula. These studies were analyzed in three ways: (a) comparison of means, (b) comparison of statistically significant differences, and (c) meta-analysis.

Comparison of the means of the groups involved in the 34 studies overwhelmingly favored Direct Instruction curricula. In 80% of the studies, the Direct Instruction groups scored higher than the control or comparison groups. Comparison of statistically significant outcomes involved a frequency count of statistically significant differences. Over 64% of the differences were statistically significant in favor of Direct Instruction. Statistically significant differences favoring non-Direct Instruction groups were found in 1% of the studies, and nearly 35% of the comparisons showed no statistically significant differences between groups.

Meta-analysis involved the comparison of effect sizes for 10 variables (i.e., students in general education and special education, years of publication, elementary versus secondary students, academic content areas, outcomes measured on norm-referenced and criterion-referenced assessments, causal-comparative to experimental research designs, intervention length, monitoring of

classroom performance, and the country in which the program was implemented) across the 34 studies. According to Adams and Engelmann (1996) a minimum effect size of .25 is necessary for a research finding to be considered educationally significant. Further, an effect size of .50 would be considered a medium effect size and .75 a large effect size rarely seen in educational research. Effect sizes across the 34 studies ranged from .67 to 1.50 for each of the 10 variables and .73 to 1.11 for each study in favor of the Direct Instruction programs. The average effect size for individual variables was nearly 1.0 and the average effect size per study was more than .75. These medium to large effect sizes across studies and variables indicated the consistent effectiveness of Direct Instruction programs.

Whole-School Reform Model Research

The American Institutes of Research (AIR) evaluated 24 popular whole-school reform models (Olson, 1999). The researchers first gathered any study that reported student outcomes (e.g., journal articles, unpublished case studies, and reports). A total of 130 studies were collected. These studies then were examined for their methodological rigor based on the quality and objectivity of the measurement instruments used, period of time for data collection, use of comparison or control groups, and number of students and schools included. The AIR rated the effectiveness of programs described in those studies meeting their quality indices. Each program was labeled as strong, promising, marginal, mixed/weak, or no research. Direct Instruction was one of only two models targeted for students in grades K–6 that received a “strong” rating. These findings further support the effectiveness of Direct Instruction programs.

Comparisons of Reading Curricula and the Effects of Reading Mastery

The Direct Instruction meta-analysis and the AIR research review both provide evidence for the general effectiveness of DI curricula. The following sections provide a narrative summary of 25 specific research studies comparing *Reading Mastery* to other reading curricula or investigations of the effects of the *Reading Mastery* program. Studies are grouped according to the population under investigation (i.e., general education, general education remedial readers, and special education populations) within each section. Study characteristics (i.e., program comparison/program, participants, research design, dependent variable(s), most effective program/program effectiveness, fidelity of implementation, maintenance/longitudinal data, and social validity data) are described for each population.

Method

The literature included in this research review was identified through computer searches of the ERIC, ED abstract, and PsychInfo databases. The following descriptors were used in the computer searches: (a) reading research, (b) *Reading Mastery*, (c) Direct Instruction, and (d) *DISTAR Reading*. Those articles that included published research data in peer-reviewed journals were included for review. Further, studies that did not involve the use of *Reading Mastery* were excluded. In addition to the database search, article titles from three educational journals were surveyed from 1994 to 2001 for articles related to reading instruction not identified through the computer searches. Journals searched included: (a) those from the Association for Direct Instruction (i.e., *ADI News*, *Effective School Practices*, *Journal of Direct Instruction*), (b) *Education and Treatment of Children*, and (c) *Journal of Behavioral Education*. In addition, an ancestral search (i.e., survey of reference pages) was conducted for

the articles obtained from the original search strategies. These search strategies resulted in the identification of 25 articles for review.

General Education Populations

Four studies investigated the relative effectiveness of the *Reading Mastery* or *DISTAR Reading* programs with students in general education (see Table 1). Two studies compared *Reading Mastery* and *DISTAR Reading I* (the previous version of *Reading Mastery*) to basal reading programs (i.e., *Basal Readers* and *Harcourt Brace Jovanovich Basal*) (Ashworth, 1999; Sexton, 1989). The effectiveness of *Reading Mastery* and *DISTAR Reading I* were investigated for students in a predominantly Caucasian second-grade classroom (Ashworth) and for African American first-grade students (Sexton). Results for both studies found positive effects for the *Reading Mastery* and *DISTAR Reading I* programs, with students instructed using the Direct Instruction reading curricula performing better than students instructed with basal reading programs (see Table 1). Specifically, students receiving *Reading Mastery* and *DISTAR Reading I* had higher vocabulary, comprehension, and language (developmental language, shared character's class, spelling in context, capitalization, punctuation [context and usage and expression]) scores (Ashworth) and better general comprehension, vocabulary, judgment and reasoning, and memory scores (Sexton) than students instructed with the basal reading programs. Further, Sexton found *DISTAR Reading* to be as effective for students with low initial language skills as for students with high initial language skills.

Mixed results were found for the remaining studies using general education populations. Rowl and O'Tuel (1982) investigated the relative effectiveness of *DISTAR Reading* and two reading readiness programs, *Action Reading* and the *Cognitive-Developmental Program*. Rowl and O'Tuel found that, overall, students instructed with the *Cognitive-Developmental Program* and

Table 1
Program Comparison Summary Information for Investigations Involving Students in General Education

Program Comparison (Reference)	Participants	Research Design	Dependent Variable(s)	Most Effective Program(s)	Fidelity of Implementation	Maintenance/ Longitudinal Data	Social Validity Data
1. SRA Direct Instruction Reading Program vs. Basal Readers (Ashworth, 1999)	36 second graders	Nonequivalent Control Group	Vocabulary, comprehension, and spelling language	SRA Direct Instruction Reading	Not reported	Not reported	Not reported
2. <i>DISTAR Reading I</i> vs. Harcourt Brace Jovanovich Basal (Sexton, 1989)	80 African American first graders	Nonequivalent Control Group	General comprehension, vocabulary and verbal fluency, judgment and reasoning, arithmetic reasoning, memory and concentration, and visual motor skills	<i>DISTAR Reading I</i>	Not reported	Not reported	Not reported
3. <i>DISTAR Reading</i> vs. <i>Action Reading</i> vs. the <i>Cognitive-Developmental Program</i> (Rawl & O'Tuel, 1982)	96 kindergartners	Nonequivalent Control Group	Alphabet skills, visual-auditory discrimination, language, prereading, and math	<i>DISTAR Reading</i> and the <i>Cognitive-Developmental Program</i>	Unscheduled monitoring of the classrooms was conducted, but no data were reported	Not reported	Not reported
4. <i>DISTAR Reading</i> vs. <i>Lippincott Basic Readers</i> (Ryckman, McCartin, & Sebesta, 1976)	70 kindergartners and 66 first graders	Nonequivalent Control Group	Cognition of semantic units (comprehension of single words or phrases), convergent production of semantic systems (able to produce a response generally accepted as correct), and divergent production of semantic units (able to generate a variety of responses to a given stimulus)	<i>DISTAR Reading</i> (significantly higher cognition of semantic units). No statistically significant differences between the programs for the other variables.	Not reported	Not reported	Not reported

DISTAR Reading performed higher than students instructed with *Action Reading* on alphabet skill, visual–auditory discrimination, language, prereading, and math tasks. However, students instructed with the *Cognitive–Developmental Program* performed higher on visual–auditory and math tasks than students instructed with *DISTAR Reading*. Additionally, students instructed with *Action Reading* performed higher on visual–auditory discrimination tasks than students in *DISTAR Reading*. Ryckman, McCartin, and Sebesta (1976) compared *DISTAR Reading* and *Lippincott Basic Readers* with students in general education. Kindergarten students instructed with *DISTAR Reading* performed higher on the cognition of semantic units (comprehension of single words and phrases). No other statistically significant differences in student performance were observed between the two programs.

In general, the published research literature suggests that using *Reading Mastery* and other Direct Instruction reading programs results in positive reading and language outcomes for general education students. Relative to other reading programs, the Direct Instruction programs generally were more effective at improving student reading performance.

General Education Remedial Readers

Eight studies investigated the effects of *Reading Mastery*, *DISTAR Reading I and II*, and *Corrective Reading/DISTAR Reading* with general education remedial readers (see Table 2). All students included in these studies performed below their same-aged peers in reading or reading readiness skills but did not receive special education services. These eight studies sampled a variety of diverse populations. For example, Gunn, Biglan, Smolkowski, and Ary (2000) included students for whom English was their second language (ESL). The authors analyzed the results in terms of the impact of the *Reading Mastery* program on ESL students and non-ESL students. The authors found that non-ESL students tended to make

greater gains than ESL students in reading performance. However, ESL students instructed with *Reading Mastery* made greater gains than students in a control group who did not receive supplemental *Reading Mastery* instruction. Other studies included students from low–middle income families (Dowdell, 1996), rural communities (Umbach, Darch, & Halpin, 1992), urban communities (Branwhite, 1983; Dowdell, 1996; Richardson, DiBenedetto, Christ, Press, & Winsberg, 1978), and schools with culturally diverse students (Traweek & Berninger, 1997).

As shown in Table 2, six of the eight studies included in this review found *Reading Mastery*, *DISTAR Reading I and II*, or *Corrective Reading/DISTAR Reading* to be more effective than the reading instruction received by control groups (e.g., Branwhite, 1983; Brent, DiObilda, & Gavin, 1986; Dowdell, 1996; Gunn et al., 2000; Summerell & Brannigan, 1977; Umbach et al., 1992). For example, Brent et al. (1986) compared *Reading Mastery* delivered by experienced and inexperienced Direct Instruction teachers to instruction with traditional basal readers. Experienced teachers were those who had used Direct Instruction programs for more than 1 year. The authors found that while student performance was greater when instructed with *Reading Mastery* than when instructed with traditional basal readers, student performance was maximal when instruction in *Reading Mastery* was paired with an experienced Direct Instruction teacher.

The remaining two studies (i.e., Richardson et al., 1978; Traweek & Berninger, 1997) found no statistically significant differences between the performance of students instructed with *DISTAR Reading* or *Corrective Reading/DISTAR Reading* and other reading instructional approaches. In both studies, participants made gains in their reading performance regardless of the instructional program used.

As with general education populations, published reading research studies suggest that

Table 2

Program Comparison Summary Information for Investigations Involving General Education Remedial Readers

Program Comparison (Reference)	Participants	Research Design	Dependent Variable(s)	Most Effective Program(s)	Fidelity of Implementation	Maintenance/ Longitudinal Data	Social Validity Data
1. <i>DISTAR Reading II</i> vs. Diagnostic-Prescriptive Remediation (Branwhite, 1983)	14 students assigned to reading remediation (median age 8 years, 7 months)	Nonequivalent Control Group	Word recognition	<i>DISTAR Reading II</i>	Not reported	Not reported	Not reported
2. Inexperienced vs. Experienced <i>Reading Mastery</i> Teachers vs. Basal Readers (Brent, DiObilda, & Gavin, 1986)	120 at-risk first and second graders	Nonequivalent Control Group	Decoding, vocabulary, comprehension, and total reading	Experienced <i>Reading Mastery</i> teachers	Several on-site clinical supervision visits, but no data were reported	Not reported	Not reported
3. <i>DISTAR Reading</i> vs. Control Group (Dowdell, 1996)	60 at-risk minority sixth graders	Nonequivalent Control Group	Reading achievement	<i>DISTAR Reading</i>	Not reported	Not reported	Not reported
4. <i>Reading Mastery</i> and <i>Corrective Reading</i> vs. Control Group (Gunn, Biglan, Smolkowski, & Ary, 2000)	204 Hispanic and non-Hispanic students in kindergarten through Grade 3 who were aggressive or below grade level	Nonequivalent Control Group	Phonemic awareness, decoding skills, reading fluency, and reading comprehension	<i>Reading Mastery</i> & <i>Corrective Reading</i>	Observations using a direct observation checklist and feedback given to teachers, but no data were reported on these checklists	Not reported	Not reported
5. <i>DISTAR Reading</i> vs. Johnny Right-to-Read (Summerell & Brannigan, 1977)	24 at-risk second graders	Nonequivalent Control Group	Word meaning and paragraph meaning	<i>DISTAR Reading</i> on paragraph meaning	Not reported	Not reported	Not reported
6. <i>Reading Mastery</i> vs. Houghton-Mifflin Reading Series (Umbach, Darch, & Halpin, 1992)	31 low performing first graders	Nonequivalent Control Group	Letter identification, word identification, decoding skills, and word and passage comprehension	<i>Reading Mastery</i>	Observation once per week and feedback given to teachers on curricular implementation, but no data were reported on these observations	Not reported	Not reported
7. <i>Corrective Reading/DISTAR Reading</i> vs. Integrated Skills Method (Richardson, DiBenedetto, Christ, Press, & Winsberg, 1978)	72 at-risk second through sixth graders	Nonequivalent Control Group	IQ, memory, and skills to synthesize or integrate parts into meaningful wholes	No statistically significant differences	Not reported	Not reported	Not reported
8. <i>DISTAR Reading</i> vs. Integrated Reading-Writing (Traweek & Berninger, 1997)	38 first graders at-risk for literacy problems	Nonequivalent Control Group	Word reading, writing, and orthographic and phonological skills	No statistically significant differences	Teachers were monitored, but no data were reported	Not reported	Not reported

Reading Mastery and other Direct Instruction reading programs were more effective than other reading programs in improving the reading performance of general education remedial readers. In six of eight studies, students receiving Direct Instruction reading programs outperformed students receiving other reading instruction. Although not significantly greater than students receiving other reading programs, students in the remaining two studies who received Direct Instruction reading programs also made substantial reading gains.

Special Education Populations

Nine studies compared the effects of *Reading Mastery* and *DISTAR Reading I, II, and III* to other reading programs with students receiving special education services (see Table 3). The results of three of these studies favored the *Reading Mastery* and *DISTAR Reading* programs (Isaacs & Stennett, 1980; Stein & Goldman, 1980; Stennett & Isaacs, 1977). Stein and Goldman investigated the relative efficacy of *DISTAR Reading* and the *Palo Alto Reading* programs. The authors found that students with learning disabilities instructed with *DISTAR Reading* had significantly higher reading skills and general achievement than students instructed using the *Palo Alto Reading* program. The two other studies were part of a series of studies investigating the effectiveness of *DISTAR Reading* with students receiving special education services in junior opportunity classes (Isaacs & Stennett, 1980; Stennett & Isaacs, 1977). Both studies found instruction with *DISTAR Reading* resulted in greater reading achievement compared to “traditional” reading instruction. Specifically, the students instructed with *DISTAR Reading* demonstrated more rapid rates of reading improvement.

Results were mixed for six additional studies involving students who received special education services. Meaningful differences were not found between students with developmental

delays instructed with *Reading Mastery* or Addison Wesley’s *Meet the Superkids* programs on initial posttest and delayed posttest measures (O’Conner, Jenkins, Cole, & Mills, 1993). Students instructed with *Reading Mastery I and II*, however, were found to have significantly better long-term reading and general achievement performance (i.e., reading recognition, reading comprehension, and spelling skills) than students instructed with the *Meet the Superkids* program. Marston, Deno, Kim, Diment, and Rogers (1995) compared the effects of six research-based teaching strategies (computer-assisted instruction, Direct Instruction, direct instruction with Holt materials, effective teaching, peer tutoring, and reciprocal teaching) with students with mild disabilities. Although Direct Instruction, specifically *DISTAR Reading*, was found to increase academic achievement, the authors found that direct instruction with Holt materials and computer-assisted instruction resulted in the greatest achievement gains. Finally, Serwer, Shapiro, and Shapiro (1973) found perceptual–motor training and a combination of perceptual–motor training and *DISTAR Reading* to result in relatively greater student performance than instruction with *DISTAR Reading* alone.

Two studies found *DISTAR Reading* to be equal in effectiveness to other reading programs (i.e., *Basal Readers* and *Rebus Reading Systems*). Although Kuder (1990) found students showed greater gains 2 years after instruction with *DISTAR Reading* than students instructed with *Basal Readers*, these gains were not statistically significant. Further, Appfel, Kelleher, Lilly, and Richardson (1991) demonstrated that the reading performance of students with moderate mental retardation could be improved using either *DISTAR Reading* or *Rebus Reading Systems* (a whole word, look-say approach using pictographic symbols) as evidenced by their advancement to conventional reading programs. However, no statistical comparison was made between the two reading approaches in this study.

Table 3
Program Comparison Summary Information for Investigations Involving Students in Special Education

Program Comparison (Reference)	Participants	Research Design	Dependent Variable(s)	Most Effective Program(s)	Fidelity of Implementation	Maintenance/ Longitudinal Data	Social Validity Data
1. <i>DISTAR Reading vs. Palo Alto Reading Program</i> (Stein & Goldman, 1980)	63 students with learning disabilities (ages of 6 through 8)	Nonequivalent Control Group	Overall reading ability	<i>DISTAR Reading</i>	Not reported	Not reported	Not reported
2. <i>DISTAR Reading vs. "Traditional" reading instruction</i> (Isaacs & Stennett, 1980)	48 students receiving special education services (average age = 9 years)	Nonequivalent Control Group with longitudinal data	Comprehension, oral reading skills, and word identification	<i>DISTAR Reading</i>	Not reported	Yes, longitudinal data were reported	Not reported
3. <i>DISTAR Reading vs. "Traditional" reading instruction</i> (Stennett & Isaacs, 1977)	83 students receiving special education services (average age = 9 years)	Nonequivalent Control Group with longitudinal data	Comprehension, oral reading skills, auditory blending, grapheme-phoneme correspondence, decoding nonsense words, and word recognition	<i>DISTAR Reading</i>	Referred to monitoring the program as done in a previous study, but no data were reported	Yes, longitudinal data were reported	Some anecdotal information provided
4. <i>DISTAR Reading vs. Five Research-Based Teaching Strategies</i> (Marston, Deno, Kim, Diment, & Rogers, 1995)	176 first through sixth graders with mild disabilities	Nonequivalent Control Group	Reading achievement and instructional ecology	Computer-aided instruction and direct instruction with Holt materials	At least two observations were conducted for each teacher, but no data were reported	Not reported	Not reported
5. <i>Reading Mastery I and II vs. Addison Wesley's Meet the Superkids</i> (O'Conner, Jenkins, Cole, & Mills, 1993)	Eighty-one 6-year-old children with developmental delays	Nonequivalent Control Group with longitudinal data	General cognitive skills, general knowledge of shapes, common symbols, letter names, matching, and word reading, visual, sound, and reading recognition, vocabulary, comprehension, total reading, reading comprehension, and spelling	No statistically significant differences immediately following intervention. <i>Reading Mastery I and II</i> were found to have a greater long-term impact	Reported that monitoring of teachers took place, but no specific information or data were reported	Yes, 1-year follow-up data were reported	Not reported
6. <i>DISTAR Reading vs. perceptual-motor training vs. DISTAR Reading plus perceptual-motor training vs. control group</i> (Serwer, Shapiro, & Shapiro, 1973)	63 first graders with specific learning disabilities	Nonequivalent Control Group	Word recognition, identification of letter names, listening skills, auditory blending, word knowledge, word training discrimination, reading, arithmetic, total oral reading, omission on words, wrong endings, handwriting, spelling, fine and gross motor tasks, rhythm, stationary balance, locomotor balance, direction, body awareness, and hand-eye coordination	Perceptual-motor training and <i>DISTAR Reading</i> plus perceptual-motor	Not reported	Not reported	Not reported
7. <i>DISTAR Reading and Peabody Language Development Kits (PLDK) vs. Rebus Reading and PDK vs. DISTAR Reading and DISTAR Language</i> (Apffel, Kelleher, Lilly, & Richardson, 1991)	60 students with moderate mental retardation (ages 10-14)	Nonequivalent Control Group	Symbol identification, reading sounds, nonsense blends and syllables, correct and incorrect program responses, and vocabulary	No statistically significant differences	Not reported	Not reported	Not reported
8. <i>DISTAR Reading vs. Basal Readers</i> (Kuder, 1990)	48 students with learning disabilities (median age 8 years, 10 months)	Nonequivalent Control Group with longitudinal data	Reading achievement	No statistically significant differences	Teachers reported they had implemented the curricula appropriately, but no data were collected or reported	Yes, longitudinal data were reported	Not reported
9. <i>Reading Mastery vs. Stabilized Learning System Program</i> (Herrera, Logan, Cooker, Morris, & Lyman, 1997)	83 third through fifth graders with learning disabilities	Nonequivalent Control Group	Word recognition, passage reading fluency, and spelling	Stabilized Learning System Program	Not reported	Not reported	Not reported

One of the nine studies involving special education populations found that students using *Reading Mastery* were outperformed by students receiving another reading instruction program. Herrera, Logan, Cooker, Morris, and Lyman (1997) compared the effects of *Reading Mastery* with the *Stabilized Learning System* program for students with learning disabilities. The *Stabilized Learning System* was described as an implicit instructional intervention that involved sensorimotor and perceptual motor activities. Herrera et al. found that students instructed with the *Stabilized Learning System* program made greater gains in writing vocabulary, sight vocabulary accuracy, and sight vocabulary fluency as measured by the Orange County Curriculum-Based Assessment. No statistically significant differences were observed between the two groups on familiar and unfamiliar passage reading subtests from the same assessment tool.

The published reading research literature indicates mixed effectiveness of *Reading Mastery* and other Direct Instruction reading programs for students receiving special education services. In three of nine studies, students receiving Direct Instruction reading programs outperformed students receiving other reading instruction. Five studies demonstrated at least one positive effect of Direct Instruction reading relative to other reading programs. However, the results from these studies either (a) did not include statistical comparisons of group performance, (b) found nonsignificance between treatment and control groups, or (c) did not favor Direct Instruction programs on some dependent measures. Further, one study found that students using *Reading Mastery* were outperformed by students receiving another reading instruction program (*Stabilized Learning System*). In short, the inconsistent pattern of results for comparative studies involving special education populations indicates an area of weakness in the published literature requiring further investigation.

In addition to the comparative research studies described above, four studies have investigated the effectiveness of *Reading Mastery* and *DISTAR Reading* without comparison to other reading curricula for students with various disabilities (see Table 4). All of these studies showed that student performance improved after instruction with *Reading Mastery* or *DISTAR Reading*. Three investigations included longitudinal data (Booth, Hewitt, Jenkins, & Maggs, 1979; Gersten & Maggs, 1982; Kuder, 1991). For example, Gersten and Maggs (1982) investigated the long-term impact of instruction with *Reading Mastery* by assessing student performance 5 years after instruction. The authors found that, on average, IQ scores increased by more than one standard deviation. Oral reading and language posttest measures supported the finding that the students' skills had improved.

Conclusion

The published research suggests that the use of *Reading Mastery/DISTAR Reading* results in positive reading and language outcomes for general education students, general education remedial readers, and special education students. Relative to other reading programs, the Direct Instruction programs generally were more effective in improving student reading performance. Overall, 14 of the 21 comparison studies (67%) favored the use of *Reading Mastery/DISTAR Reading*, while other reading programs were favored in three studies (14%). No statistically significant differences were found in four investigations (19%). All four investigations involving students in general education (see Table 1) favored Direct Instruction programs. Six of the eight studies (75%) involving general education remedial readers (see Table 2) favored *Reading Mastery/DISTAR Reading*, no statistically significant differences were found in the remaining two studies. Findings were less consistent for special education populations (see Table 3). Four of the nine studies (44%) favored *DISTAR Reading*, while three of the nine investigations

Table 4

Program Summary Information for Investigations Involving Students in Special Education

Program (Reference)	Participants	Research Design	Dependent Variable(s)	Program Effectiveness	Fidelity of Implementation	Maintenance/ Longitudinal Data	Social Validity Data
1. <i>DISTAR Reading and DISTAR Language</i> (Booth, Hewitt, Jenkins, & Maggs, 1979)	12 students with mental retardation (ages 8–14)	One shot case study with longitudinal data	Receptive and expressive language, word reading, accuracy of oral reading, and literal comprehension	Student performance improved	Not reported	Yes, longitudinal data were reported	Not reported
2. <i>DISTAR Reading I, II, & III and DISTAR Language I, II, & III</i> (Gersten & Maggs, 1982)	12 adolescents with moderate mental retardation (ages 6 years, 10 months through 12 years, 6 months)	One shot case study with longitudinal data	IQ, receptive and expressive language, accuracy of oral reading, and literal comprehension	Student performance improved an average gain of 5.8 standard score points	Observations were conducted and a data sheet was used to collect information on specific teacher behaviors, but these data were not reported	Yes, longitudinal data were reported	Not reported
3. <i>DISTAR Reading</i> (Kuder, 1991)	26 students with learning disabilities (ages 7–10)	One shot case study with longitudinal data	Receptive language, word discrimination, and sentence imitation, word attack, and reading comprehension	Student performance improved by an average of 4 months (range = 0 to 9 months)	Reported that periodic checks were made, but no data were reported	Yes, longitudinal data were reported	Not reported
4. <i>DISTAR Reading I</i> (Bracey, Maggs, & Morath, 1975)	6 students with moderate mental retardation (ages 7–14)	One shot case study	Blending of sounds, spelling of sounds, letter–sound correspondence, and decoding	Student performance improved	Not reported	Not reported	Not reported

(33%) favored other programs; no statistically significant differences were found in two of the nine studies (22%). These results suggest that other factors may influence successful reading instruction for students with disabilities. Within the context of this research review, future directions of reading research are described.

Future Directions

High reading achievement is a critical prerequisite for successful educational performance and participation in society. A large body of research clearly supports beginning reading instruction that explicitly teaches phonemic awareness, phonics, and blending. Additionally, research supports the use of the teaching strategies incorporated in the Direct Instruction approach. *Reading Mastery* aligns in content and instructional approach to these research-validated practices. Although this review of the *Reading Mastery* literature provides evidence in support of the use of *Reading Mastery* with a variety of populations, the following section describes nine directions for future investigations of the effects of the *Reading Mastery* program.

Program Implementation

Few of the reviewed studies included detailed information regarding the implementation of *DISTAR Reading* or *Reading Mastery*. *Reading Mastery* has multiple levels (I, II, III, IV, V, and VI), an accelerated *Fast Cycle* program, and *Plus*. Each level moves students through more complex tasks and requires higher skill levels. Research evaluating the effectiveness of *Reading Mastery* should specify which level of the program was used and how much of the program was completed. Research is also needed on implementation of the entire program. None of the reviewed studies noted the use of an entire level of the *Reading Mastery* program.

Adams and Engelmann (1996) discuss the importance of progressing through Direct Instruction curricula at the expected rate.

The authors note that groups with students with high skills master about 1.3 lessons per instructional day, middle groups complete 1.0 lessons per day, and lower skill groups complete about .7 lessons per day. Only two of the reviewed studies reported the number of lessons completed per day (Gersten & Maggs, 1982; Gunn et al., 2000). Related to this is the amount of time devoted to instruction. Only 13 of the 25 reviewed studies noted information regarding the number of minutes of instruction per day or the total number of hours of instruction (Apffel et al., 1991; Bracey, Maggs, & Morath, 1975; Gersten & Maggs, 1982; Gunn et al., 2000; Kuder, 1991; Marston et al., 1995; O'Connor, Jenkins, Cole, & Mills, 1993; Richardson et al., 1978; Serwer et al., 1973; Sexton, 1989; Stein & Goldman, 1980; Summerell & Brannigan, 1977; Umbach et al., 1992). Only 8 of the 25 reviewed studies reported the number of days/weeks/months of instruction (Gersten & Maggs, 1982; Gunn et al., 2000; Kuder, 1990; Kuder, 1991; Marston et al., 1995; O'Connor et al., 1993; Sexton, 1989; Summerell & Brannigan, 1977). Although several of the studies mention grouping students into small, instructional groups, none of the studies specified the number of groups or the skill levels of the groups. Future studies should specify the levels of the program completed, the number of instructional lessons completed per day and over the course of the study, the amount of time devoted to instruction, and the skill levels of the instructional groups.

Fidelity of Implementation Data

The majority of the studies presented in this review (14 of 25) lacked data on the fidelity of the implementation of the curricula. Additionally, none of the 11 studies that did mention any monitoring of the implementation of the curriculum reported any quantitative data about the fidelity of the curricular implementations (see Tables 1, 2, 3, and 4). In order to assess the effects of a particular reading curriculum, it is imperative that the cur-

riculum be implemented accurately. Related to this is the training of the teachers implementing the curricula. Direct Instruction curricula require specific teaching techniques and behaviors. It is possible that the effects of Direct Instruction curricula on student performance will vary depending on the experience/training of the teachers. Brent et al. (1986) explored this issue and found that although students instructed with *Reading Mastery* performed better than a control group, there were statistically significant differences between *Reading Mastery* groups taught by experienced and inexperienced DI teachers. Only 14 of the 25 reviewed studies indicated that training of the teachers implementing the reading curricula took place or involved experienced DI teachers. However, most of these studies did not describe the type of training received. Another indication of effective teaching of DI curricula is the percentage of first time correct responses given by the students. None of the studies report this kind of data. Data on the experience of the teachers implementing the curricula, teacher training, data collected on the fidelity of the implementation of the curricula, and data on first time correct student responses should be included in future investigations.

Maintenance and Generalization Data

The ultimate goal of reading instruction is to provide students with decoding, fluency, and reading comprehension skills that can be applied in a wide range of settings. Hence, the evaluation of the effectiveness of a reading instruction curriculum should include the assessment of the maintenance and generalization of these skills. Three questions need to be addressed. First, do students maintain reading skills gained after reading instruction? Second, do reading skills gained from reading instruction generalize to other contexts (e.g., science class, history, etc.)? Only 6 of the 25 reviewed studies collected longitudinal data assessing whether reading skills maintain over

time after instruction with *DISTAR Reading/Reading Mastery*. With the exception of assessment of overall academic achievement, none of the reviewed studies investigated the impact of instruction with *DISTAR Reading/Reading Mastery* on performance in other content areas.

Social Validity

None of the reviewed studies reported the social validity of *DISTAR Reading/Reading Mastery* (see Tables 1, 2, 3, and 4). There are three concerns of social validity that should be considered (Wolf, 1978): (a) The goals of the intervention should be determined. Obviously, teaching reading is an important goal. Although there are ample data to suggest that *DISTAR Reading/Reading Mastery* results in improved reading skills, not everyone in education is convinced that the specific skills taught in Direct Instruction are worthwhile. (b) It should be determined if the procedures used were worth the results. This is an especially important area of concern since Direct Instruction has not been a widely popular approach by reading teachers. Therefore, data on the social acceptance of teaching using *DISTAR Reading/Reading Mastery* should be determined. (c) The social validity of the effects should be determined. An important area for teachers is to answer the question of whether students acquire a “love” for reading. In other words, does reading become reinforcing in and of itself? Unfortunately, a frequent criticism of *DISTAR Reading/Reading Mastery* is that students begin to find reading aversive. Therefore, data must be gathered on the reinforcing value of reading for students after the program is completed. In order to answer several of these questions, subjective data may need to be gathered. While objective data are preferable, the validity of objective data can be supported with systematic subjective measures, such as ratings by teachers, students, and parents. Thus, it is not reasonable enough to dismiss subjective data because “a number of the most important concepts of our

culture are subjective, perhaps even the most important” (Wolf, 1978, p. 210). Future studies should include social validity measures of *Reading Mastery*.

Research on Reading Mastery

The majority of the studies (19 of 25 studies) included in this review investigated the effects of *DISTAR Reading* (the older version of *Reading Mastery*). Although *DISTAR Reading* and *Reading Mastery* are very similar, several important changes were made in *Reading Mastery*. *DISTAR Reading* was first published in 1968. A revised version was then published in 1974. This second version was substantially different from the original edition. The 1974 edition was considered much easier to teach and included additional components such as storybooks and workbooks. This second edition also included the changes suggested by teachers in Project Follow Through sites throughout the country. For example, in the original edition teachers had to provide most of the practice to firm sounds on their own. However, the 1974 edition prompted this firming process by page layout and added review practice. The program name was changed to *Reading Mastery* in 1983 when Levels III–VI and an accelerated *Fast Cycle* program were added, creating a full reading series for kindergarten through sixth grade as opposed to a kindergarten through third grade program. Since 1983, changes to the series have continued to be cosmetic (i.e., new illustrations, new covers) or minor changes have been incorporated making the program easier to use (i.e., dots under sounds, more scaffolding of rhyming). *Reading Mastery Plus* was added in 2002; no published research was found on the use of this new addition to the *Reading Mastery* series. Due to these differences, the research base for *Reading Mastery* should be expanded.

Experimental Analysis

Several major methodological issues of the reviewed studies warrant future experimental

analysis of the effects of *Reading Mastery*. Specifically, many threats to the external and internal validity are present in the reviewed studies. Due to a lack of random selection and assignment of participants to groups, the confidence with which the observed results may be attributed to the interventions is limited. Of the 21 studies that compared the effects of *DISTAR Reading/Reading Mastery* to other reading curricula, five studies matched participants in experimental and control groups on a variety of variables (e.g., phonological awareness, language skills), two studies matched participants and then randomly assigned them to experimental and control groups, and one study randomly assigned participants to groups. Future research should attempt to randomly select participants from the target population, randomly assign participants to groups, and/or assess group equivalence prior to conducting research.

Implementation of Reading Mastery With Other DI Curricula

Three of the reviewed studies investigated the *DISTAR Reading/Reading Mastery* program in conjunction with another DI (e.g., *DISTAR Language*, *DISTAR Arithmetic*) or non-DI program (e.g., perceptual-motor training). Future studies should compare the effects of the implementation of *Reading Mastery* alone vs. the implementation of *Reading Mastery* along with other DI or non-DI curricula.

Calculation of Effect Sizes

Statistical significance describes the probability of differences between groups existing due to chance. However, of even greater importance is the educational significance of the findings. As opposed to statistical significance that identifies the probability that the results were due to chance alone, educational significance refers to the extent to which the relationship between the dependent and independent variable is meaningful in the real world. According to Adams and Engelmann (1996), an intervention that changes the per-

formance of students by .25 of a standard deviation is considered educationally significant. This form of significance is considered much more important than traditional statistically significant differences. Effect size measures describe the magnitude of the differences observed between groups independent of sample size. Hence, an effect size of .25 or greater indicates educational significance. Only 2 of the 25 reviewed studies (Gersten & Maggs, 1982; O'Connor et al., 1993) included effect size measures. Future research on the effects of *Reading Mastery* should consider the magnitude of the statistical and educational significance of differences observed between groups by reporting effect size measures.

Populations

Future investigations should continue to involve diverse populations. Only four studies investigated the effects of *Reading Mastery* or *DISTAR Reading* with general education students (Ashworth, 1999; Rawl & O'Tuel, 1982; Ryckman et al., 1976; Sexton, 1989). Direct Instruction curricula are often mistakenly associated for use only with students with special needs. The findings of these four studies suggest otherwise; however, further investigations are needed. Only one investigation included students for whom English was their second language (Gunn et al., 2000). ESL students are a growing population within the United States and schools increasingly struggle to identify effective instructional programs for them. Gunn et al. suggest that *Reading Mastery* effectively increases the skills of ESL students; however, further replications of this research are needed. The investigations involving students receiving special education primarily included students with learning disabilities or mental retardation (9 of 13). Future investigations should address the effects of *Reading Mastery* with students with other disabilities (e.g., emotional and behavioral disorders, communication disorders) and from varying socioeconomic backgrounds, communities, and school settings.

Dependent Variables and Measures

As shown in Tables 1, 2, 3, and 4, the 25 reviewed studies measured the effects of *DISTAR Reading/Reading Mastery* on a variety of dependent variables. Most commonly, overall academic achievement, reading achievement, and IQ were measured. These variables were measured with a variety of norm-referenced and informal assessments. However, with the more recent emphasis on educational reform and teacher/school accountability, more relevant measures might include district or state assessments. Only two of the reviewed studies indicated that assessments required by their districts were used as dependent measures. Further, the scope of dependent variables might be expanded to include analysis of the effects of instruction with *Reading Mastery* on performance in other content areas. For example, do students instructed with *Reading Mastery* perform better in mathematics and science classes than students instructed with other reading curricula?

Conclusion

As previously stated, learning to read in the elementary years is an essential stepping stone toward successful educational performance and advancement in our society. Hence, the most effective beginning reading curricula available should be used with our students. *Reading Mastery* results in positive reading and language outcomes for general education students, general education remedial readers, and students in special education. Relative to other reading curricula, instruction with *Reading Mastery* appears to be more effective in improving student reading performance. We encourage authors, publishers, and teachers to continue to investigate the effects of *Reading Mastery* in consideration of our recommendations. This line of research will continue to ensure we are using beginning reading curricula that best serve the needs of our students.

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