To read with joy and understanding, to learn and grow through reading, to read critically and thoughtfully are the goals of all reading programs. The way different programs approach these goals are what distinguish one program from another. Reading Mastery incorporates perhaps the largest variety of instructional techniques of any commercially developed reading program available. Some programs provide a set of instructional techniques for building comprehension skills, but omit specific phonics instruction for decoding. Other programs feature a set of techniques to teach decoding, but omit comprehension instruction. Reading Mastery, on the other hand, incorporates techniques for teaching both comprehension and decoding and integrating them into successful reading.

The large research base of Reading Mastery distinguishes it from all other currently available commercially developed reading programs. The specific instructional techniques, as well as the program as a whole, have proven superior in extensive research involving students of all ability levels. These studies have generally found that the more Reading Mastery differs from a comparison program, the better it accelerates the acquisition of reading competence and improves the quality of reading for all students.

These research findings are reported below. The first section reviews research evaluating specific features of Reading Mastery. The second section reviews studies comparing the overall effectiveness of Reading Mastery with other reading programs.

Different types of research are used to answer different types of questions. The question of interest throughout this review is, what instructional techniques or programs are most effective? To claim that one approach is better than another, the research must compare the approach with other approaches. The research reviewed below is, therefore, comparative research.

Reading approaches have changed quite dramatically over the years. To review only the most recent research would result in only a comparison with the most recent approach, whole language. To provide a more complete picture of the available knowledge base regarding effective reading instruction, the studies reported below cover several decades. This cumulative perspective includes a critique of earlier phonics approaches and other methods, thus providing overall a more balanced perspective.

Some readers may suspect that there is bias in the selection and reporting of the research conclusions below. To allay these suspicions, consider asking other publishers for the comparative research supporting the features used in their programs or the effectiveness of their programs in general. You may find that some of them categorically reject comparative research.

Research Regarding the Design of a Superior Reading Program
To gain meaning from text (i.e., comprehension) is the purpose of reading, but gaining meaning is not possible unless a reader can translate the printed words into the language they represent (i.e., decode). Reading comprehension assumes decoding ability. Decoding is the ability to translate print into language, a process often referred to as "using phonics."

The research of the last few decades strongly indicates that a phonic approach during initial reading acquisition (approximately the first year or two of reading instruction) is better than a meaning-emphasis approach. A meaning-emphasis approach emphasizes the importance of using meaningful contexts to learn how to read. In contrast, a phonic approach deals with meaning in the form of story-listening activities and other activities designed to develop the children's oral language comprehension. These comprehension activities are gradually integrated into the reading activities as students become more competent decoders, until reading comprehension skills become the focus of reading instruction in *Reading Mastery III.*

Technical notes supporting the conclusion: Focused instruction in decoding (phonics) is superior to instruction that does not provide a decoding focus.

In reporting results of 25 acceptable studies undertaken between 1900 and 1960 (Chall, 1967), Chall concluded that focused instruction in phonics was superior to instruction without this focus in teaching students word recognition, oral reading, and spelling (Chall 1983). These findings held for both low performers and normally-achieving students.

Research reported by Dykstra (1968) on end-of-school-grade effects, and Bond and Dykstra (1967) on end-of-first-grade effects, confirmed the superiority of a phonics approach in teaching word recognition and spelling. Dykstra's later work (1974) supported his earlier conclusions.

Jeffrey and Samuels (1976) and Polloway, Epstein, Polloway, Patton, and Ball (1986) found that a phonics program resulted in significantly better reading comprehension than other programs.

Haskell et al. (1992) found that students who received 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.

Dieterich (1973) concluded that "one of the few conclusions of reading research in which we can have a high degree of confidence is that earlier and more systematic instruction in phonics is essential" (p. 7).

In their well-known report, *Becoming a Nation of Readers* (Anderson, Hiebert, Scott, & Wilkinson, 1985), the National Commission on Education reviewed the research on reading and concluded that adopting a phonic (code-emphasis) approach to reading instruction in America would greatly improve literacy. Adams (1988), commissioned by the National Center for the Study of Reading to comprehensively review all the research on reading, concluded that the research supports phonic approaches for initial reading instruction. (One of the criteria in selecting Adams for the task was the reviewer should have no vested interest in any particular approach to reading instruction.)

Stahl and Miller (1989) reviewed the research comparing whole language and language experience approaches with other approaches and found "strikingly larger effects for systematic phonics used in first

Stanovich (1994) reports that when he began his 20-year career as a reading researcher he believed that meaning-emphasis programs would prove to be better for comprehension. Through his own research he became convinced otherwise. "That direct instruction in alphabetic coding facilitates early reading acquisition is one of the most well established conclusions in all of behavioral science" (p. 285).

Foorman (1995) reviewed the research on the great debate and concluded, "there is empirical evidence favors explicit instruction in alphabetic coding" (p. 388). Baker and Stahl (1994) emphasize the importance of explicitly teaching alphabetic coding.

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**Decoding: Learning to Read**

In spite of years of research indicating that a phonics approach is best, the majority of the reading programs that have been used in schools either do not teach phonics at all or have taught it as an afterthought to a meaning-emphasis approach (e.g., whole-word or whole-language approaches).

Even among phonics-based programs, not all have been equal. Beck (1985) cautioned against the wholesale acceptance of reading curricula that promote an emphasis on phonics skills. In her evaluation of phonics programs, she proposed that even when phonics is taught, the "wrong kind of phonics instruction" can result in the perpetuation of word-attack difficulties (p. 243). She noted that phonics instruction was often too abstract and relied on skills that were too difficult for most learners to extract.

Many authorities suggest that to turn from whole language to a phonics-based approach is to return to the basal program designs of the 1980's (Willis, 1995). However, most of the basals of the 1980's did not incorporate research-based features of effective phonics instruction, though they did include a phonics component. Some of the most important features of effective decoding instruction are contrasted below with examples of the faulty way phonics was taught in 1980 basals. The research-based features described are uniquely characteristic of *Reading Mastery Levels I and II*. Research studies showing that the *Reading Mastery* techniques are superior to the other more commonly known techniques are briefly summarized in the technical notes.

**Features of Effective Instruction for Beginning Readers**

*Teach phonemic awareness explicitly.* Phonemic awareness is prerequisite to learning phonics so the tasks do not yet involve the children in reading. Though the importance of phonemic awareness has only recently received attention in the research, *Reading Mastery I* has included instruction in phonemic awareness for years. Phonemic awareness is developed by first starting with something all children can typically do, saying drawn out words fast:

Then later the task becomes more focused on blending phonemes:

Teacher: "Listen. ssss Say it fast." Slam.

In addition, children learn to isolate, blend, discriminate all the phonemes before they begin to identify the letters for each phoneme in Reading Mastery.

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**Technical notes: Teach phonemic awareness explicitly.**

Recent research on phonemic awareness has found the following types of tasks to have a positive effect on reading acquisition and spelling: rhyming, auditorily discriminating sounds that are different, blending spoken sounds into words, word-to-word matching, isolating sounds in words, counting phonemes, segmenting spoken words into sounds, deleting sounds from words (Ball & Blachman, 1991; Byrne & Fielding-Barnsley, 1990; Cunningham, 1990; Lie, 1991; Lundberg, Frost, & Petersen, 1988; O'Connor, Jenkins, & Slocum, 1983; Smith, Simmons, & Kameenui, 1995; Vellutino & Scanlon, 1987b; Yopp, 1988). Lack of phonemic awareness seems to be a major obstacle for some children in learning to read (Vellutino & Scanlon, 1987a; Wagner & Torgeson, 1987).

Explicit phonemic awareness instruction is more effective than implicit (Cunningham, 1990). In a study by Ball and Blachman (1991), 7 weeks of explicit instruction in phonemic awareness combined with explicit instruction in letter-sound correspondences for kindergarten children was more powerful than instruction in letter-sound correspondences alone and more powerful than language activities in improving reading skills.

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**Introduce each new letter-sound correspondence explicitly.** Most basal reading programs of the 1980's as well as the linguistic basals of the 1970's, did not present letter-sound correspondences explicitly. Instead they recommended that letter-sound correspondences be presented implicitly. The following instructions from such an implicit phonic approach published by Harcourt, Brace, Jovanovich, direct the teacher to introduce the sound for $s$:

(Write the words sun and soap on the chalkboard. Point to each word, say it, and have the children repeat it.) "The words sun and soap begin with the same sound. They also begin with the same letter." (Point to the $s$ in sun.) "What letter does the word sun begin with?" (Students say the letter name, $s$.) "The letter s stands for the beginning sound in sun." (Point to the s in soap.) "What letter does the word soap begin with?" (Students say the letter name, $s$.) "The letter $s$ also stands for the beginning sound in the word soap." (Point to the $s$ in both words.) "The letter $s$ stands for the beginning sound in the words sun and soap." (Early, Cooper, Santeusanio, 1983, p. 70).

As is typical of the implicit approach, the sound [sss] for the letter $s$ is never explicitly stated by the teacher, nor does the letter $s$ appear in isolation. In contrast, the following is an example of instructions that present the letter-sound correspondence for $s$ in Reading Mastery Level I.
(Write $s$ on the blackboard. Point to $s$.) "This sound is sss. What sound?" (Students say the sound, sss.)

In *Reading Mastery* the letter-sound correspondence is clearly and explicitly presented.

To expect the child to isolate the sound on her/his own requires skill in phonemic segmentation, which has been shown to be very difficult for young children (Bruce, 1964; Rosner, 1973). The teacher can both speed the reading acquisition process and prevent reading failure by directly telling children the sounds for letters.

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**Technical notes: Each letter-sound correspondence should be taught explicitly.**


Over the years an enormous amount of research effort has gone into evaluating whether instruction in specific letter-sound correspondences was important for reading acquisition. The two famous reading research reviews by the Commission on Reading (Anderson, Hiebert, Scott, & Wilkinson, 1985) and Adams (1988) both concluded that the research supported an explicit phonics approach. Similar conclusions were drawn from a meta-analysis conducted by Pflaum, Walberg, Karagianes, and Rasher (1980), and in a longitudinal study on reading comprehension acquisition (Meyer, Hastings, Wardrop, & Linn, 1988).


Another group of studies find no differences (Fox & Routh, 1976; Muller, 1973). Putnam & Youtz (1972) initially found results favoring an implicit approach, but by second grade the explicit phonics group significantly outperformed the implicit phonics group on a measure of reading comprehension.

Several studies found explicit phonics more effective for low-performing, at-risk or special education students of varying ages (Biggins & Uhler, 1979; Enfield, 1976; Richardson, Winsberg, & Binler, 1973; Williams, 1980).

Taken together these findings indicate that although explicit instruction in letter-sound correspondences does not seem necessary for every group of children, it is for others. On the other hand, implicit phonics instruction offers no known advantage over explicit phonics. Because explicit phonics instruction never seems to hurt and often seems to help, one can conclude that a reading program that teaches letter-sound correspondences explicitly, such as *Reading Mastery*, will better meet the needs of all students, not just some students.
Select and sequence letter-sound correspondences carefully. Many basal readers with a phonics component in the 1980s exposed students to too many letter-sound relationships and taught non-essential verbal rules about phonics. For example, one basal reader, although not known for providing intensive phonics, tried to teach over 200 letter-sound correspondences (American Book Company, 1980). These included such low-frequency letter-sound correspondences as *ch* sounding like /k/ as in *chorus* and *sc* sounding like /s/ as in *scene*.

*Reading Mastery* analyzes the language carefully to identify the most frequent, highly useful letter-sound correspondences. Only 40 letter-sound correspondences are taught in *Reading Mastery*. The special orthography used by *Reading Mastery* reduces the number of letter-sound correspondences the children must initially learn to get started reading interesting stories. Because of this special orthography, the stories for beginning readers are more interesting and meaningful than the stories in programs using regular orthography. Although *Reading Mastery* is a phonic or code-emphasis program, the special orthography and interesting stories allow reading comprehension to also remain a focus in initial reading instruction.

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Technical notes: Select high-frequency letter-sound relationships and sequence them carefully.

Burmeister (1975) synthesized a number of studies evaluating the utility of the 100 to 200 phonic generalizations that were taught in traditional basals. Most of the traditional phonics rules did not generalize well enough to justify teaching them; there were more exceptions to the rule than instances of the rule. Others were rarely used in words the children read in children's literature (e.g., *sc* sounds like /sss/ as in *scene*). She identified a smaller set of approximately 45 letter-sound correspondences that had a utility rate high enough to justify instruction. By learning only one sound for each unique letter or pair of letters (e.g., *ai*), children
could decode 95% of the sounds in the preceding five sentences and would reach close approximations for 98% of the sounds (e.g., f in of sounds like v, not f.

The rules used to sequence the introduction of letter-sound correspondences have been evaluated in comparative research by Carnine (1980c).

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**Teach students to blend.** Blending sounds together to make words (sounding out) is a critical step in reading. The reader approximates the word by sounding out and then matches the approximation to a real word from her oral language that fits the context of the passage. Teachers who spend more time on blending produce greater gains on reading achievement tests of young readers. Beck's (1981) analysis of eight popular reading programs teaching phonics revealed that in the most popular of these programs (Bank Street Readers, 1973; Sullivan Programmed Reading, 1973; Ginn, 1984; Houghton Mifflin, 1983; Merrill Linguistic Reading Program, 1975; and Scott Foresman, 1974), there were no procedures for teaching blending.

Beck (1981) found that only Reading Mastery had a definite and effective instructional strategy for teaching blending. The unique strategy used in Reading Mastery to teach blending is included in the Early Literacy program of the American Federation of Teachers as "the Engelmann blending strategy" (Hastings, Tangel, Bader, & Billups, 1995)

An effective blending strategy models the way that sounds blend together into words. This blending practice begins as soon as the pupil knows two sounds to blend together, for example /a/ and /m/. The teacher models the practice by pointing to a in am and saying /aaa/ as in fat for two seconds, and then by pointing to the m and saying /mmm/ again for two seconds. There should be no break between the sounds. Students then say the sounds (in the same way) as the teacher points to the letters. When the teacher says, "say it fast," the students say the word am. The teacher verifies that the students have identified a meaningful word by saying, "Yes, am, like in 'I am the teacher.'"

The word ma'am could also be sounded out, but "ma" as a short form for mother uses a different sound for a. The pupils only learn to produce the sound /aaa/ as in am for the letter a. When pupils encounter a word like ma, they will sound it out with the a sound as in fat and then use the context of a sentence to adjust /ma/ to /maw/ as the word is correctly pronounced. Thus, ma would not be an appropriate word to have pupils sound out until they have learned enough sounds to be able to work in a context of words.

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**Technical notes: Pupils should be taught how to blend sounds together into words.**

Coleman (1970) noted that blending is a strategy that students can apply to many different words, but direct instruction in the blending strategy using many sounds is necessary before students will acquire the
generalized skill. Skailand (1971) and Silberman (1964) reported that if subjects are taught sound-symbol relationships but not blending, they will not use sounding out as a decoding strategy. Bishop (1964), Jeffrey and Samuels (1967), Carnine (1977), and Vandever and Neville (1976) reported that teaching letter-sound correspondences and sounding out resulted in students' correctly identifying more unfamiliar words than when students were trained on a whole-word strategy. Haddock (1976) and Chapman and Kamm (1974) found that only when blending is directly taught will students successfully use a sounding-out strategy for attacking words.

Beck (1981) found that only the Reading Mastery program taught students a blending strategy sufficiently. Since 1981 basals have moved away from phonics and blending.

Use code-based reading passages for daily practice as children progress in learning new letter-sound correspondences. The most important consideration in effective beginning reading instruction is the selection of a code-based program, a reading program with reading passages containing a high percentage of words composed of letter-sound correspondences the children have learned. Using code-based reading material in the first year or two of instruction is critical to effective reading instruction, because the material typically is arranged so that cumulative review is available in the reading passages. As new letter-sound correspondences are mastered, they are incorporated into the stories children read.

A high proportion of the words in the earliest selections a child reads must conform to the phonics he or she has been taught. Otherwise, there will be little opportunity to apply and practice the letter-sound relationships in actual reading tasks. The letter-sound correspondences that the children learn will appear useless to them in a program with passages that are not code-based. Unfortunately, this opportunity for practice is most often lacking because code-based readers are rarely used in schools. For example, a popular basal reader in the 80's with a phonic component (American Book Company, 1980) taught the letter-sound relationships of d, m, s, r, and f before children read their first complete sentence. The first sentence the children read was, "The dog is up." In this sentence, the d was the only letter-sound correspondence the children had learned.

It is not easy creating a code-based reader that does not compromise the use of natural sounding language in some way. The linguistic readers in the 1970's were 70 to 80% code-based. Yet many of the early sentences the children read were very stilted, as in the SRA Basal Reading Series. For example, after children learned the sounds for a, n, N, c, d, D, and f, the children could read, "Nan can fan Dan."

The authors of Reading Mastery found a unique solution to this dilemma. In order to use more interesting stories and maintain the conformity of the words with the phonic generalizations that have been taught, the program uses special orthography in the very beginning that allows the use of a wider range of words in the first stories children read. Contrast this story from very early in Reading Mastery with a story from a meaning-emphasis program at about the same point in the first grade.

From Reading Mastery:
He has no feet. He has no nose. He has no teeth. He is not a cow, and he is not a cat. Is he a rat? No, he is not a rat.

From a meaning-emphasis program, *Ginn* 1984.

Little Duck said, "I can't hop. I can swim, but I can't hop. I don't want to swim. I want to hop, Little Rabbit. You can hop fast. I want to hop like a rabbit."

The *Reading Mastery* story contains natural-sounding language, and all the words in the passage conform to the phonic generalizations the students have learned. In order to use natural-sounding language the *Reading Mastery* authors created the special orthography that closely resembles regular print, but contains some special prompts to get children quickly reading. These prompts are faded before the end of *Reading Mastery II*.

Technical notes: Use code-based readers rather than reading material that requires pupils to use context to figure out words.

Beck and McCaslin (1978) analyzed eight reading programs and found that *Reading Mastery* was 100% code-oriented while meaning-emphasis programs were 13%, 3%, and 0% code-based. In reviewing the problems of a whole language approach, Foorman (1995) commented, "Thus, to the extent that meaning-oriented programs include instruction in phonic principles, there is little opportunity to practice applying these principles in connected reading. On the other hand, just because a program is described as a phonics program, one cannot assume that there will be a good match between phonic generalizations taught and opportunity to exercise the generalization in text" (p. 377).

Pupils who learn to read in *Reading Mastery* are able to use context to figure out new vocabulary words just as readily as pupils taught in a meaning-emphasis program (Carnine, Carnine, & Gersten, 1984).

Singer, Samuels, and Spiroff (1973) compared three procedures for introducing new words: words in isolation, words in sentences (context), and words with pictures. Both context and picture cues slowed acquisition. During the beginning reading stage, students often are not proficient enough in decoding to benefit from context clues (Groff, 1976; Hochberg, 1970), and, in fact, the context clues may draw their attention away from the letters that make up the word. In a review of the research on using pictures to facilitate student learning of a sight vocabulary, Samuels (1970) found that pictures hamper performance. The experiments usually compared two groups in which a picture appeared with each word and one without pictures. When pictures accompanied the words, students required longer to reach criterion and made more errors than when pictures were not present. More recent research tends to confirm these findings (Harzem, Lee, & Miles, 1976). Contrary findings do not test the students on word identification without the pictures (Denberg, 1976). Since the pictures were always present in Denburg's study, the students may have learned nothing more than picture reading. The reason for having illustrations is that they increase student enjoyment (Samuels, Biesbock, & Terry, 1974). For this reason, *Reading Mastery* contains pictures which students see after they have read the story, "Now you've read the story. Turn the page and look at the picture."

Although Goodman (1965) found that students correctly identified more words when they were presented in context (rather than in isolation), other researchers did not replicate this effect (Williams & Carnine, 1978). Gibson and Levin (1975) also conclude that the sooner a child learns that what s/he says is determined by the
letters that make up the words, the better: "Many children start school with the notion that reading is speaking with books open in front of them. The speech is not nonsensical. Still, the earlier the realization by the child that what he says must be determined by what is printed, the better is the prognosis for early reading achievement" (p. 282).

**Provide immediate feedback on oral reading errors.** Most beginning reading programs recommend silent reading. However, having children read silently when they are not proficient will only make their errors and misrules more difficult to correct. The best way for a teacher to identify inaccurate reading tendencies is to listen to children read orally. It is crucial that students receive corrective feedback on all errors during oral reading so they do not develop inaccurate reading habits.

Another common instructional practice is to correct only errors that change the meaning of the passage. If a child reads girl for lady, the child is not corrected. If the child reads lunch for lady, the child would be corrected. The rationale for this approach is to encourage students to use context. However, comparative research shows that both comprehension and reading accuracy improve when all reading errors are corrected, whether the errors changed the meaning of the passage or not. In *Reading Mastery* all errors are corrected.

Corrective feedback though is consistent with the child's knowledge of phonics and children are expected to use context to adjust the pronunciation of the word to match their oral language. For example, children just learning the word *said* would be correct in sounding out the word *said* as "s-a(as in fat)-i(as in it)-d" using the letter-sound correspondences she has learned. But the child is also expected to use the context of a sentence to realize the word is *said* and adjust the pronunciation accordingly. The teacher would not tell the child who sounds out the word correctly but does not say *said*, "That is wrong; the word is *said*." Instead, she would say, "Good sounding out that word. That's the way we sound it out, but this is how we say it, *said*." (If a third grader said the same sounds, the teacher would say, "That is wrong; the word is *said*." The third grader should not be using sounds for common words such as *said*.)

In *Reading Mastery* every error is corrected and children learn to use both phonics and context in constructing understanding.

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**Technical notes: Every oral reading error should be corrected.**

Pany and McCoy (1988) found that third-grade children with reading disabilities who made a large number of errors during reading (10%-15%) significantly improved their word recognition and comprehension scores when given immediate feedback on every single error. When corrective feedback was provided after every error, the children made significantly fewer errors overall, significantly fewer meaning-change errors during reading of the passage, significantly fewer errors on lists of error words presented on an immediate
and delayed basis, and significantly fewer errors on passage-comprehension questions. Simply receiving feedback on errors that altered the meaning of the passages had no effect.

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**Build accuracy and fluency.** In the *Reading Mastery* program, children do partner reading where they each take a turn doing a one-minute timed reading of a passage from the daily story while the partner takes error data. Eventually all the children have the goal to read 100 words in one minute with less than 2 errors. Children who are performing very far below this criterion should be placed in a lower reading group or be given additional tutoring.

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**Technical notes: Build accuracy and fluency with daily performance measures, goals, and decision rules for making instructional changes.**

There is a strong relationship between oral reading fluency and reading comprehension (Fuchs, Fuchs, & Maxwell, 1988; Potter & Wamre, 1990; Shinn, Good, Knutson, Tilly, & Collins, 1992). Word identification becomes less capacity-demanding as experience with words increases (Stanovich, 1991). Stahl and Heubach (1993) found that stressing fluency and automaticity had large effects on second graders' reading growth.

Research by Bohannon (1975), Jenkins, Mayhall, Peschka, and Townsend (1974), and Mirkin (1977) has shown that the reading performance is best when teachers base their instructional decisions on daily performance measures of reading fluency and accuracy. Mirkin (1977) compared reading improvement under four conditions: (a) daily oral reading practice; (b) daily practice plus goal setting; (c) daily practice and goal setting plus daily measurement; and (d) all previous components plus specific decision rules for making instructional decisions. She found the last condition superior.

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**Responses to Common Criticisms of Reading Mastery I and II**

**The orthography is not authentic.** The special orthography used in *Reading Mastery* contains very subtle prompts that allow beginning readers to use the code they are learning to sound out stories that are much more interesting than the stories in other code-based programs. Other code-based programs, which do not use special orthography, either have a lower proportion of words in the initial passages that conform to the letter-sound correspondences the children have learned or use more stilted language (e.g., Nan can fan Dan.) Even programs that emphasize meaning use patterns of phrases that are less than natural sounding in initial reading instruction.

**Phonics teaches the wrong purpose for reading.** One of the major criticisms of phonics approaches such as *Reading Mastery* is that reading is regarded as a mindless activity and is devoid of purpose because children do not have to use context to decode. This conception of *Reading Mastery* is not true because children who sound out words in *Reading Mastery* only
arrive at an approximation for many words. Successful reading requires the use of context in matching the phonic representation of some words with the word from the child's oral language which fits the meaning of the sentence. Specific research investigating this question found that Reading Mastery does develop children's ability to use context (Carnine, Carnine, & Gersten, 1984).

**Phonics skills are not needed for good reading.** Marie Carbo (1987), a frequent and strong critic of phonics approaches, maintains that good readers exist who have never mastered phonics. She presents the following example of a phonics task:

Say the word in each shape. If you hear a vowel sound that you hear in *hard*, color the shape green. If you hear a vowel sound that you hear in *corn*, color the shape blue. If you hear a vowel sound that you hear in *first*, color the shape orange.

This example was taken from a program which used essentially a whole-word approach to teach reading and only included a token phonic component (i.e., phonics was not systematically taught and integrated with reading). This type of phonics task has no research base and is irrelevant to reading. Certainly readers exist who cannot perform this task. Phonics skills, however, are not irrelevant. A pupil must be able to represent the letters in a new word as sounds to be able to turn print into language, and thereby read.

Other examples of common learning activities which are not part of a research-based phonic approach and which are irrelevant to reading are: requiring pupils to label sounds as long or short; requiring pupils to name the letters of the alphabet; or generally requiring pupils to memorize any verbal rules, such as "when two vowels go walking the first one does the talking." A research-based phonic approach simply presents a small set of letters or letter groups (e.g., ai, ou, ow, ee, oi) in isolation and systematically has pupils orally respond with the most common sound for those letters.

**Phonics produces poor comprehension.** Some authorities criticize phonic approaches because students who have been taught from these programs have sometimes been found to be weak comprehenders in spite of good decoding skills. However, a child who cannot decode (i.e., cannot say the words when reading orally) has no hope of comprehending. Learning to decode does not ensure comprehension, but a child who can decode subsequently can be taught strategies for better comprehension. There is no reason to believe that the phonic approach caused the weakness in comprehension. The child who learned to decode from a phonic approach, but has weak comprehension, is probably the child who would have failed completely in the whole-word or whole-language approach.

**How a child best learns to read is a matter of style.** Many maintain that different methods are required for different learning styles (see Stahl & Kuhn, 1995, for a review of these). There is very little evidence to support this in the case of learning to read (Stahl & Kuhn, 1995). Being able to produce sounds for some letters is essential to being able to read with understanding, and therefore, not a matter of learning style. In a descriptive study of children's reading problems, Bryant and Bradley (1985) concluded that phonic instruction would benefit all learners. They found that children with reading problems were generally the children on the end of a continuum.
of pupils who could not figure out the sounds for letters themselves. Bryant and Bradley speculated that the pupils who become good readers could figure out many of these letter-sound relationships without explicit instruction, and would probably do so even more readily if they were actually taught these relationships.

Summary

Research indicates that the best reading instruction involves systematically teaching children the most common sounds for a selected group of letters and letter combinations. These letter-sound correspondences should then be practiced immediately in the context of words and, as soon as possible, in the context of sentences. Initial reading instruction should incorporate extensive oral reading practice with immediate corrective feedback. These recommendations cover only the first few months of reading instruction. Students must learn quickly to move beyond sounding out to sight-word reading. No other reading program incorporates all of these features to the extent that the Reading Mastery program does.

Comprehension: Reading to Learn

Students who learn to read in Reading Mastery have generally learned to read by the end of first grade and begin using reading as a tool at the beginning of second grade in Reading Mastery III. (Note: This assumes the children started Reading Mastery I in Kindergarten or started in first grade with the Fast Cycle I/III, which is designed for children of average or above average ability.)

Children who start using reading as a tool by the end of first grade have 3 more years of using reading as a tool than a child who reads by the end of fourth grade. These extra years can have a significant positive effect on a child's life. Because this is such an uncommonly early timeline for reading, many might assume that this timeline causes undue pressure on young children who in turn may become frustrated and lose self-esteem.

Self-esteem grows with rapid, easy learning. Children learning from Reading Mastery do not lose self-esteem; quite the contrary, their self-esteem flourishes due to their success. This success is largely a result of the efforts of the instructional designers of Reading Mastery, rather than a result of inordinate effort from the children or the teachers. Reading Mastery was engineered to make children and teachers successful with as little effort on their part as possible. The uncommon effort that went into the design of Reading Mastery accounts for the uncommon results: the rapid, easy acquisition of reading skills. For this reason, children's self-esteem flourishes as they see themselves rapidly progressing in their reading ability.

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Technical notes: Children in Reading Mastery have high self-esteem.

In the evaluation of Project Follow Through (see later section describing the design of Follow Through), Abt Associates reported the following:
"The performance of Follow Through children in the Direct Instruction [Reading Mastery] sites on the affective measures is an unexpected result. The Direct Instruction Model does not explicitly emphasize affective outcomes of instruction, but the sponsor has asserted that they will be consequences of effective teaching. Critics of the model have predicted that the emphasis on tightly controlled instruction might discourage children from freely expressing themselves, and thus inhibit the development of self-esteem and other affective skills. In fact, this is not the case" (Abt, IV-B, 1977, p. 73).

The Direct Instruction model, involving the use of DISTAR (an earlier version of the lower levels of Reading Mastery) achieved the greatest number of positive results in the area of self-esteem. The five major child-centered models, which claimed self-esteem as an important goal, actually resulted in more negative effects for self-esteem.

**Teach expository reading skills specifically.** As children begin learning to use reading as a tool they need to learn many strategies for improving their comprehension. Reading Mastery teaches the general comprehension skills that are taught in most reading programs and effect, making inferences, finding the main idea, sequencing events, seeing humor many other less traditional comprehension strategies. Most importantly, Reading Mastery specifically prepares children for academic success in the expository kinds of reading materials that are used in academic content areas. Children acquire a knowledge base of fundamental concepts and rules in science and social studies and learn reasoning and analysis strategies for scientific thinking in any domain, strategies that are not found in any other instructional program.

**Technical notes: Narrative reading skills do not readily transfer to expository reading.**

Narrative and expository texts have been found to have differential effects upon readers, with narrative being easier to comprehend than expository (Zabrucky & Ratner, 1992.) The ability to comprehend and formulate expository prose is essential for achievement in school (Seidenberg, 1989).

**Preteach new vocabulary.** Vocabulary concept deficiencies are a primary cause of academic failure in grades 3 through 12 (Baumann & Kameenui, 1991; Becker, 1977; Stanovich, 1986). Reading Mastery teaches important academic concepts for the sciences and social studies directly, as well as teaching children how to use context to figure out the meanings of new words they encounter. (Making inferences from context is discussed under "Teaching inferences").

Reading Mastery uses a variety of strategies to teach vocabulary. Some words are taught directly by simply providing a synonym. The following is an example of this strategy used to teach the meaning of paralyzed:

Teacher: "When you're **paralyzed**, you cannot move. Here's another way of saying, She could not move her hand: Her hand was paralyzed. Your turn. What's another way of saying, He could not move his leg?"

Other vocabulary words receive more intensive practice requiring students to use the words to label pictures. Many difficult or important academic concepts are taught thoroughly with
examples and nonexamples. For example, *sarcasm* is carefully taught because it is a difficult but important concept in understanding meaning.

Sometimes people say the opposite of what they really mean. But they give evidence that they don't mean what they say. When people speak in that way, they are using sarcasm.

1. Here's an example of sarcasm:
   *A boy says, "I just love going to school. I love to sit there all day long and do boring things. I love to work and study when I could be outside playing and swimming with nobody to tell me what to do."
*
   a. How does the boy say he feels about school? (He loves it.)
   b. The boy gives evidence that contradicts what he says. Name something he says about school that contradicts the idea that he loves it. (He does boring things; he could be playing.)

2. Here's another example of sarcasm:
   *A woman says, "My, wasn't that a good television show. There's nothing I like more than watching two people argue about unimportant things, like cleaning the house. The show was almost as exciting as waiting for a bus in the rain."
*
   a. The woman says something that she later contradicts. What is that? (That it was a good TV show.)
   b. Name one piece of evidence that contradicts her statement. (The people were arguing about unimportant things; the show was dull.)

**Skip technical notes and go to next heading**

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**Technical notes: Use a variety of strategies for communicating word meaning.**

No single one best method for teaching vocabulary has been identified (Beck & McKeown, 1991). A number of instructional strategies (synonyms, sentences and examples, examples and nonexamples, and so on) have yielded positive effects (Baker, Simmons, & Kameenui, 1995).

**Technical notes: Provide a wide range of examples and minimally different nonexamples to effectively teach an important concept.**

Important academic concepts should be carefully taught. Children often form misconceptions when they are left to derive conceptual understanding from the context of their own experience. Research has noted the prevalence of these misconceptions particularly in the area of science concepts (Driver & Erickson, 1983; Gilbert & Watts, 1983; Osborne & Wittrock, 1985; Schneps, 1987). Simply presenting experiences that contradict a misconception, without explicit instruction in the nature of the concept, has not resulted in much success (Brna, 1987, 1988; Finegold & Gorsky, 1988; Hewson & Hewson, 1983; Roth & Anderson, 1988; Stavy & Berkovitz, 1980; White & Horwitz, 1988; Zeitsman & Hewson, 1986). The problem with this indirect approach seems to be that children seem to form conceptions based on what they believe *usually* happens and interpret contradictory experiences as exceptions to their rule, rather than feeling compelled by the contradiction to revise their rule.
Misconceptions can be changed to scientific conceptions through carefully designed Direct Instruction. Concept instruction is highly effective when the presentation includes (a) a sequence of minimally different examples that highlight distinctive features of the concept, and (b) a wide range of positive examples that illustrate the breadth of the concept (Condon, in press). Using both of these design principles together results in deeper scientific understandings, better problem solving and reasoning for populations of all ages (Carnine, 1980a; Carnine, 1980b; Carnine, Kameenui, & Maggs, 1982; Grossen, Carnine, Niedelman, & Miller, 1996; Grossen, Lee, & Johnston, 1995; Grossen, Carnine, & Lee, 1996; Klausmeier & Allen, 1978; Klausmeier & Feldman, 1975; Muthukrishna, Carnine, Grossen, & Miller, 1993; Petty & Jansson, 1987; Tennyson & Cochiarella, 1986; Tennyson & Park, 1980).

Technical notes: Teaching vocabulary concepts explicitly has a positive effect on comprehension and on the ability to use context to learn new words.

Of course, direct instruction of vocabulary can teach no more than a fraction of the words that students need to learn during their K-12 years. However, direct teaching can have significant effects not only on comprehension of passages containing taught words, but also on comprehension in general and on the ability to learn new words in context. Beck, Perfetti, and McKeown (1982) found that students who were given direct instruction in word meanings were better able to discern meanings of untaught words than control subjects. Stahl and Fairbanks (1986) suggest that teaching 350 words each year may augment learning from context by 10 to 30%, a significant amount.

Present big ideas that will generalize to other applications. Big ideas are underlying concepts or schemas that are a key to understanding and that facilitate the greatest amount of learning. A timeline is a big idea taught in Level III. The timeline concept is introduced with a rule about garbage piles: Things near the bottom of the pile went into the pile earlier. This rule is then used to analyze an archeological dig and a time line appears showing the "first thing" and the "last thing" to go into the pile. The figure below shows how the timeline concept integrates the rule about piles with the progressive development of the skeleton of the horse over time, and a historical perspective. Later when the children read about dinosaurs, Odysseus and the battle of Troy, or a future time machine, and so on, they use the timeline to place the occurrence of the event in perspective.
Technical notes: Teach big ideas.

Big ideas are emerging as an important feature of effective instructional design (Shinn & Carnine, 1994; Kameenui & Carnine, in press).

**Preteach critical background knowledge.** Most lessons in levels III and IV include a "comprehension passage" that teach important background knowledge for better understanding of the story that follows. For example, before the children read about two Eskimo children's life-threatening adventure drifting on an ice chunk, they read "Facts about Drifting." Before reading about Toby the kangaroo's boxing match, the children read "Facts about Boxing." After learning about the relationship between weight and pressure, the children help a hero solve a problem involving animal tracking. (The bigger animal can be identified by the deeper track.)

With this technique children learn important science and social studies fundamentals about gravity, the solar system, types of mammals, the midnight sun, levers, pressure, the parts of a ship, and much, much more. The children have immediate opportunities to use their new
knowledge to better understand and interpret interesting narrative stories they read following the brief comprehension lesson.

**Technical notes: Preteach prerequisite knowledge.**

Building prior knowledge important to the understanding of a selection can have a significant and impressive positive effect on comprehension (Graves & Cooke, 1980; Graves & Palmer, 1981; Graves, Cooke, & La Berge, 1983). Hayes and Tierney (1982) found that presenting background information related to the topic to be read helped readers learn from text regardless of how the background information was presented or how specific or general it was.

**Use pre-, interspersed, and postquestions strategically.** Interspersed questions are used throughout earlier levels of Reading Mastery to teach students a variety of comprehension strategies. These questions serve to model for the children how good readers think about their reading as they read. Many, many skills are communicated to children through these interspersed questions. During this time children should also be encouraged to read trade books independently. Opportunities for extended silent reading are valuable. However, Reading Mastery continues to move the children forward into more challenging material teaching them more and more sophisticated critical thinking and analysis skills for reading all genres of narrative material, as well as expository material.

In later levels of Reading Mastery, the children read longer passages silently. These passages begin with general prequestions that the students are asked to respond to when they finish reading. For example, H.G. Wells The Star, Part 1, begins with these questions:

Find out:

What made the new star. Where that star was heading. Why the star became brighter and brighter.

After students have read the passage, the teacher asks them these three questions, as well as one more:

What was one schoolgirl worried about?

The rationale for prequestions is that students need to learn to read for a variety of purposes, sometimes for a specific purpose and sometimes with a general purpose. To prevent children from becoming too focused on just finding the information to answer the questions, at least one more question is always asked in the postquestions than was presented in the prequestions.

**Technical notes: Use of pre-, interspersed, and postquestions.**

Prequestions can improve comprehension if they are general and focus on the most important information in the text (Rickards, 1976). When prequestions are given to students again after they read, as postquestions, their effect on learning can increase (White, 1981). Prequestions are especially effective if the passage is difficult to comprehend (Hartley & Davies, 1976; Levin & Pressley, 1981). Prequestions can restrict incidental learning focusing attention on specific information (Anderson & Biddle, 1975).
Inserted factual and application questions result in better responses not only to the same questions asked again after reading, but also to other questions as well (Watts & Anderson, 1971).

**Teach inferences.** *Reading Mastery* teaches many kinds of inferences throughout all levels. In these activities students are required to use evidence to infer. The first strategy for drawing inferences requires children to imagine themselves in the stories. Children in *Reading Mastery III* get many opportunities to imagine themselves in stories. Here's an example of a text the children read:

"The people are inside their cave. The wind is blowing outside. It's cold outside. Cold."

For this passage the teacher says,

"Everybody, put yourself in that story. You're inside this cave. You don't have a lot of warm clothes the wind outside is blowing. It's cold. Now close your eyes and feel that cold."

After students become accustomed to imagining themselves in stories, the students use this as a strategy for making inferences. For example, children read how Bertha was feeling when she was inside the hot trunk of a car:

"She was in a fog made up of purple dots, tingles, and a feeling that everything was falling, falling."

The teacher asks: "Was Bertha's mind clear?" This question is not answered directly by the text. Children often have trouble inferring feelings, but not in *Reading Mastery*, because the children get in the habit of imagining themselves in the stories and associating things they read about literally with other likely reactions and experiences.

An example of another type of inference involves location. The text states:

"When they had finished, Kathy said, "A plane should be able to see that."

Linda said, "Right. But a ship won't."

The comprehension task is, "Why not?"

The major types of inferences taught in *Reading Mastery III* are:

Size inferences (comparison of objects viewed by average-sized human beings and by very small animals a drop of water looks to them, how it feels to fall from a high place, how much they have to eat with respect to their body weight, and so forth).

Place inferences (comparison of customs, language, and dress of people from different places).

Temporal inferences (comparison of how things were done during different historical time periods people thought was handsome dress in 1900, how Vikings ate, comparison of how modern people and the ancient Egyptians would move grain and other goods.).
Behavior and feeling inferences (comparison of human and non-human responses to the same situation, projections of how the reader would behave in various situations).

Distance inferences (comparison of different trips instance, the distance from New York to San Francisco compared with the distance from San Francisco to Japan).

**Technical note: Analogies are effective in teaching.**

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; Gick & Holyoak, 1980, 1983; Hayes & Mateja, 1981).

**Teaching logical thinking.** *Reading Mastery* provides ample practice in deductive reasoning and focuses specifically on teaching children to refrain from drawing conclusions from insufficient evidence. For example, most children would answer this question incorrectly:

Here's a rule: A mole has legs like a shovel. A rat is not a mole. Does a rat have legs like a shovel?

Most children would answer, "yes." But that answer is wrong. The correct answer is, "maybe." Similarly, many people would miss this item:

Here's a rule: Big men are heavy.

a. Big men are heavy. An elephant is not a big man. So what else do you know about an elephant?

The pattern most children would be inclined to answer in would lead them to say, "An elephant is not heavy." Obviously, this is not true, yet the previous two statements are true. With many exercises such as these, the children learn patterns of logical and fallacious reasoning.

**Technical notes: Reasoning deductively (logically) is difficult for all populations and can be improved with explicit instruction.**

Research has documented in all populations that the most common error in reasoning is to form a conclusion without sufficient evidence (Ceraso & Provitera, 1971; Grossen, 1991; Grossen & Carnine, 1990; Grossen, Lee, & Johnston, 1995; Simpson & Johnson, 1966). Direct instruction in syllogistic reasoning can have a positive impact on these error patterns (Grossen & Carnine, 1990; Grossen, Lee, & Johnston, 1995). These effects transfer to other critical thinking and reasoning activities (Grossen, 1991; Grossen, Lee, & Johnston, 1995).

**Summary**

*Reading Mastery* teaches children a wide variety of comprehension strategies that are designed to make their later academic career more successful and rewarding. Many of these instructional techniques have not been evaluated as specific instructional strategies, and, therefore, many more of these techniques have not been described here that are probably very important to the overall success of the program. Comprehensive evaluations of *Reading Mastery* testify to the overall
comprehensive effectiveness of these strategies in improving children's comprehension and academic success. These evaluations of the *Reading Mastery* program as a whole follow.

**Research Evaluating *Reading Mastery***

Much research has identified specific techniques that are more effective than others for teaching reading. No other reading program incorporates all of the features of effectiveness with the fidelity that the *Reading Mastery* program does. However, the authors of *Reading Mastery* did more than just incorporate research-based features of effective reading instruction in designing a superior reading program. They went one step further. Before publishing *Reading Mastery*, they tried *Reading Mastery* out with ordinary teachers in ordinary classrooms across America, gathered and summarized error data from the children in these classrooms to identify error patterns, and, based on these error patterns, they completely revised the program to prevent these error patterns from occurring in the finished program. Furthermore, *Reading Mastery* has been revised five more times over the 30 years since the program was first developed. The result of these years of refinement is a superior reading program. No other reading program has been tested and refined to the extent that *Reading Mastery* has.

To evaluate the overall effectiveness of the *Reading Mastery* program, many research studies have compared the effectiveness of *Reading Mastery* with other programs. These other programs have included linguistic readers, language experience approaches, whole word basals, phonics programs, whole language programs, and more.

A useful and relatively new technique for reviewing and summarizing the results of a large number of studies is metaanalysis (Glass, McGraw, & Smith, 1981). A very recent metaanalysis by Gary Adams has summarized the research on *Reading Mastery* and other Direct Instruction programs (Adams, in press).

The procedures for a metaanalysis are well defined. First all the studies on a topic are gathered in a thorough search of all the databases and a handsearch through the most recent (unindexed) publications on the shelves. In addition Adams contacted authors of research on Direct Instruction to gather any research articles that were in press or in manuscript form.

Second, a metaanalysis procedure requires establishing a set of rules for accepting a study into the analysis. These rules are applied consistently to all the gathered studies. Studies in Adams' (in press) metaanalysis were rejected if:

- They lacked a comparison group.
- They lacked pretest scores.
- The pretest scores of the *Reading Mastery* group and the comparison group showed significant differences.
- They lacked the necessary mathematical information: means, standard deviations, and sample sizes.
- They lasted only one session (because the generalizability of these laboratory studies are questionable.)
- The *Reading Mastery* intervention was combined with other incompatible programs.
They were single-subject designs (because there is no accepted way of calculating effect sizes for this research design).

They were studies of the components of Reading Mastery (e.g., pacing, correction procedures) and not a study of the complete program.

Twenty selected studies were independently reviewed by another researcher to determine the level of reliability of Adams' selection and evaluation process. The percent agreement (reliability) was 94%. Forty-four comparisons that met the above selection criteria involved the Reading Mastery program (Appfel, Kelleher, Lilly, & Richardson, 1975; Branwhite, 1983; Brent, DiObida, & Gavin, 1986; Darch & Kameenui, 1987; Kaiser, Palumbo, Bialozor, McLaughlin, 1989; Lewis, 1982; Lloyd, Cullinan, Heins, & Epstein, 1980; Richardson, DiBenedetto, Christ, Press, & Winsberg, 1978; Sexton, 1989; Snider, 1990; Stein & Goldman, 1980; Summerell & Brannigan, 1977; Umbach, Darch, & Halpin, 1987).

Third, the result of each comparison is calculated as an effect size. An effect size describes the size of the difference between two groups and is measured in a statistical unit called a standard deviation. When 84% of the students in one group scores above or below 50% of the students in the other group, the groups differ by 1 standard deviation. For educational purposes a difference of at least .25 standard deviation is considered educationally significant. Research studies sometimes find differences smaller than .25 standard deviations "statistically significant" when a very large sample of subjects is used. Though these differences smaller than .25 may be statistically significant, they are not considered educationally significant; that is, they are not worth the expense and effort involved in purchasing and learning to use a new instructional program or procedure. An effect size of .50 is considered a medium effect size, while an effect size of .75 is considered large and is rare in educational research.

To calculate the effect size for one comparison, the mean score of the comparison group is subtracted from the mean score of the experimental (Reading Mastery) group, then divided by the pooled standard deviation of the groups. Differences favoring the comparison group would show a negative number as an effect size. Differences favoring the experimental group would be positive.

The final step of a metaanalysis involves averaging the effect sizes for all the comparisons to determine the overall effect size. Adams' (in press) analysis resulted in an effect size of .68 for the 44 acceptable comparisons involving Reading Mastery. To further place this medium to large effect size in perspective, a recent metaanalysis of the effectiveness of the whole language approach to reading found an effect size of only .09 (Stahl & Miller, 1989).

Project Follow Through

In addition to the above comparisons of Reading Mastery with other programs conducted by various researchers, Reading Mastery was also evaluated in Project Follow Through, the largest educational study ever funded by the U.S. Department of Education. Reading Mastery was one of three instructional programs included in the Direct Instruction model. (The other two programs taught language skills and mathematics.)
The U.S. Department of Education hired two independent evaluation agencies to collect and analyze the data from the implementation of 22 different models in over 180 sites involving over 20,000 children. The Direct Instruction model produced by far the greatest gains. Gary Adams' summary of the various analyses of these data and follow-up studies will be available soon.

Figure 1. Percentile Scores on a One-Fourth Standard Deviation Scale for Three Standardized Test Measures Across Nine Major Follow Through Models.

Note: The 20th percentile represents the usual level of performance of the disadvantaged children who comprised the target group of Project Follow Through. Therefore, all the percentile scores are referenced to the 20th percentile. Those bars extending to the right show improvement over the normally achieved levels. Those bars extending to the left show a reduced level of performance.

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