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Effective Academic Interventions in the United States: Evaluating and Enhancing the Acquisition of Early Reading Skills

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Abstract: The alignment of assessment, intervention, and meaningful student outcomes is arguably one of the most exciting developments in school psychology. This linkage is especially apparent in the areas of early literacy where the convergence of three areas of research and development form a dynamic process of information and feedback to enhance the effectiveness of interventions in preventing and remediating reading problems for children in early elementary grades. In this article, we develop the rationale for early and intensive literacy intervention, review the major implications of the converging evidence in early literacy and reading acquisition, and propose mechanisms to enhance early literacy development through the strategic and timely linkage of assessment and intervention. The major areas of convergence from research regarding what to teach and how to teach it are presented. The contributions and role of assessment information in developing and providing effective beginning reading and early literacy interventions are described.

In grades one through three, the primary challenge facing general education teachers and students is the acquisition of basic reading skills. No educational yardstick is used more frequently to evaluate the efficacy of schooling than literacy built upon a firm foundation of basic reading skills. In addition, poor reading skills have been linked to the development or exacerbation of concomitant behavioral and/or emotional problems, including aggressive behavior, hyperactive behavior, patterns of poor effort, poor self-concept, and school dropout.

Professional educators and the public at large have long known that reading is an enabling process that spans academic disciplines and translates into meaningful personal, social, and economic outcomes for individuals. Reading is the fulcrum of academics, the pivotal process that stabilizes and leverages children's opportunities to succeed and to become reflective, independent learners. Despite society's recognition of the

importance of successful reading, only recently have we begun to understand the profound and enduring consequences of not learning to read and the newly found evidence of the critical and short-lived period in which we can readily alter reading trajectories (Lyon & Chhabra, 1996).

The educational research program initiated by the National Institute of Child Health and Human Development (NICHD) reported that "40% of the U.S. population have reading problems severe enough to hinder their enjoyment of reading" (Grossen, 1997, p. 5). National longitudinal studies indicate that more than one in six young children experience reading difficulties in grades one through three (Kameenui, 1996). Though considerable debate surrounds the issue of differentiating children who have "reading disabilities" from those who are poor readers, the reality that almost 20% of all students have significant difficulty learning to read indicates that reading deficits are not specific to disability.

The authors express their appreciation to Gary Germann and the faculty, students, and administrators of St. Croix Education District in Pine County, Minnesota, for the use of their progress data. This research was supported, in part, by the Early Childhood Research Institute on Program Performance Measures: A Growth and Development Approach (H024360010) and by the National Center to Improve the Tools of Educators (H180M10006) funded by the U.S. Department of Education, Office of Special Education Programs. Address all correspondence concerning this article to Roland H. Good III, School Psychology Program, DABCS College of Education, 5208 University of Oregon, Eugene, OR 97403-5208, roland_good@ccmail.uoregon.edu.

Regardless of disability, children who experience severe difficulty learning to read display two common characteristics that can guide assessment and intervention. A first common denominator among students who place in the lower quartile of the reading continuum is a trajectory of reading progress that diverges extremely early from their peers who are learning to read successfully. It appears that initial differences in rate of reading acquisition establish a developmental reading trajectory that is resistant to change (e.g., Juel, 1988). The term "trajectory" refers to a relatively smooth and continuous curve of reading progress that extends through the elementary school years. The existence and stability of reading trajectories can be inferred from longitudinal data and observed directly using recent advances in reading measurement.

The second common characteristic of children who experience severe difficulty learning to read is their inability to use the phonologic structure of language to read and write in an alphabetic system. The phonologic deficit results in an inability to use the sound structure of language to learn written language. This deficit manifests itself in an array of phonologic-alphabetic tasks and reliably in the inability to segment words into phonemes and to decode nonsense words (Lyon & Chhabra, 1996). The phonologically based deficit of students with reading difficulties has garnered such empirical convergence that it has been deemed a "core deficit" (Stanovich, 1986; Torgesen & Hecht, 1996).

The task of summarizing what is known about effective interventions in the U.S. certainly is so massive as to be beyond the scope of one article. We have elected, therefore, to focus our discussion of effective interventions upon the area of greatest salience: early literacy acquisition. Given the early and stable trajectories of early reading acquisition and the phonologic/alphabetic roots of reading, we focus our discussion of effective reading intervention on the linkage of assessment and instruction. Our basic premise is that effective academic interventions are built upon the linkage of assessment and intervention. We will first examine the developmental reading trajectories of children who are at risk for reading failure. Next, we will examine the role of phonological awareness skills in early reading acquisition and the characteristics of effective phonological

awareness interventions. Finally, we will address the linkage of assessment to interventions to evaluate the effectiveness of interventions for individual students to prevent reading failure.

Differences in Developmental Reading Trajectory

Longitudinal reading studies have examined reading acquisition by measuring reading skills at isolated points in time (e.g., Juel, 1988). One of the most replicated and disturbing conclusions from these studies is that students with poor reading skills initially are likely to have poor reading skills later. Stable reading trajectories can be inferred from the high correlation between reading performance in the early primary grades and reading skills later in school. For example, Juel (1988) found that the probability of a child who was a poor reader in first grade remaining a poor reader in fourth grade was .88.

Monitoring Individual Developmental Reading Trajectories

These longitudinal correlations may not communicate sufficiently the magnitude of the problem, and they do not provide a means to monitor individual student progress or to evaluate the effectiveness of interventions. Developmental reading trajectories can be examined directly using Curriculum-based measurement (CBM) in reading (see Shinn, 1989 for information on CBM). Reading CBM procedures are based on standardized, short duration, oral reading fluency tasks. Most frequently, students read from basal reading passages usually derived from their curriculum. For program evaluation purposes, students may read word lists that are developed to represent multiple years of a curriculum. CBM reading measures have been shown to provide a valid and reliable measure of overall reading proficiency (e.g., Shinn, Good, Knutson, Tilly, & Collins, 1992). Using CBM reading, it is possible to examine students' reading trajectories directly and evaluate their rate of progress (Good & Shinn, 1990; Shinn, Good, & Stein, 1989).

The differences in reading trajectories for students are illustrated with CBM reading data from the St. Croix Education District in Minnesota. During the 1990-1991 school year, the reading progress of all students in Grades 1 through 5 from four schools was assessed monthly throughout the school year. Once per

month, all students read orally for 1 minute a stratified random sample of words from the Harris-Jacobson word list, with equal numbers of words from grade levels 1-6 on each list. Students also read orally for 1 minute from a passage sampled randomly from their grade level of the curriculum. Complete data were available for 926 of the 984 students, 177 to 201 at each grade level.

The performance of the five, single-grade cohorts on the Harris-Jacobson word lists is presented in Figure 1. For each cohort, the 10th and 50th percentiles of student performance on each monthly assessment and on the first two months of the following year are graphed. Through most of first grade, the reading skills and rates of progress of middle (50th percentile) and low (10th percentile) readers are not distinguishable. However, by the end of first grade, distinct developmental reading trajectories are apparent with the discrepancy between middle and poor readers increasing with the passage of time.

Matthew Effects: Reading Problems Get Worse

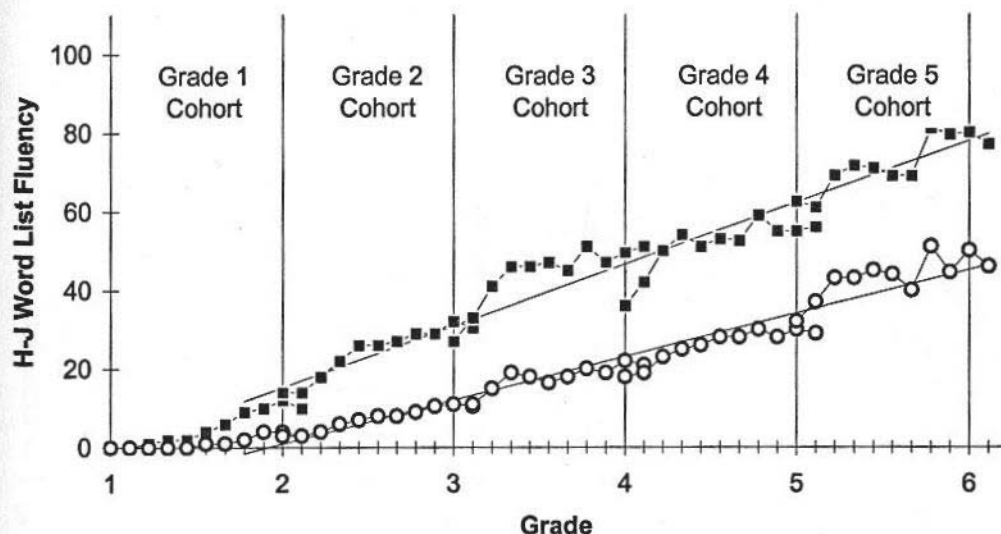
The data displayed in Figure 1 provide direct evidence of what Stanovich (1986) called a "Matthew Effect" after the biblical passage in which the rich get richer and the poor get poorer. According to Stanovich (1986), a Matthew Effect

occurs when differences in initial skills lead to faster rates of acquisition of subsequent skills for those students with high skills and slower acquisition for students with lower initial skills.

Differences in developmental reading trajectories can be explained, in part, by a predictable and consequential series of reading-related activities that begin with difficulty in foundational reading skills, progress to fewer encounters and exposure to print, and culminate in lowered motivation and desire to read (Stanovich, 1986). For example, Juel (1988) reported that, by the end of first grade, good readers in her study had seen an average of 18,681 words in running text in basal readers. In contrast, poor readers had been exposed to only 9,975 words, or about half as many words. Thus, the poor readers received half as much practice, half as much opportunity to learn, and were exposed to half as much vocabulary. As low reading trajectories become established, secondary problem behaviors can further impede effective instruction.

Both the early onset and the magnitude of the problem are illustrated by data from the St. Croix Education District. In Figure 2, the CBM reading scores on grade-level passages of second-grade students with poor reading skills (1st to 10th percentile) at the beginning of the year and middle reading skills (45th to 55th percentile) at the beginning of the year are plotted. Each line represents an individual student's develop-

Figure 1. Developmental reading trajectories of middle (median 10%) and low (lowest 10%) readers for 5, single-grade cohorts as measured by oral reading fluency on equivalent Harris-Jacobson word lists.



mental reading trajectory. Plotting the trajectories of the middle and low students in this way allows a visual comparison of (a) group performance, (b) the variability of individual performance within the group, and (c) the degree of overlap between groups. The progress of students with middle and low developmental reading trajectories are clearly distinct and non-overlapping.

For these students, low reading skills that are discrepant from their peers appear to be an intractable problem. However, the problem is not a lack of progress. Students on the low trajectory are progressing. When comparing student performance at the beginning and ending of the second grade, students on the low trajectory gained 25 words per minute in oral reading fluency. The problem is not lack of service. Many students on the low trajectory receive additional educational services and support. Of the 19 students performing in the lowest 10% of second graders, 12 were receiving Chapter 1 services and four were receiving special education. Only three were not receiving additional reading instruction. The problem of increasingly discrepant reading skills for students on a low developmental reading trajectory is twofold: they begin with lower scores, and they increase their skills at a slower rate.

The Need for Early Intervention

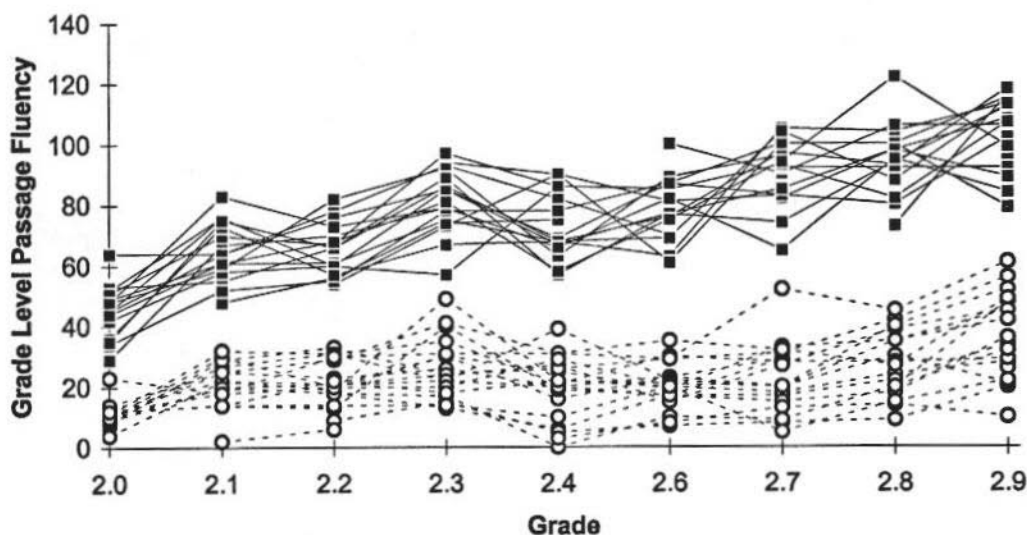
Low initial skills and low slope combine to

make "catching up" all but impossible for students on a low developmental reading trajectory. To "catch up" to students on the middle reading trajectory, students on the low trajectory must attain a reading proficiency of about 100 WCPM by the end of the year. To accomplish this goal, students on the low trajectory must increase their rate of progress from 2 WCPM per month to 10 WCPM per month. However, the mean slope of student progress for all second graders was an increase of about 5 WCPM per month ($SD = 2.34$). Consequently, students on the low trajectory must increase their *rate* of progress by 3.5 standard deviations and acquire reading skills twice as fast as the mean progress of their peers to achieve the same reading rate. The solution is to intervene early so that students have both adequate initial skills, and the necessary pre-skills to make adequate progress. With comparable initial skills, students need only to make progress at the same, not a faster, rate as their peers.

Early Identification for Early Intervention

Early intervention requires accurate identification of children at risk for reading failure. In general, direct and frequent measures of reading skills such as CBM have been most accurate in identifying children with reading problems and providing a basis for evaluating interventions (Shinn, 1989). However, even direct measures

Figure 2. Second grade reading trajectories of lowest 10 percent ($n = 19$) and middle 10 percent ($n = 17$) of readers as measured by oral reading fluency on grade level passages.



such as reading CBM cannot identify children who will experience reading failure early enough to prevent the establishment of low reading trajectories. This problem is illustrated in Figure 3 in which individual reading trajectories on grade level passages are plotted for students whose reading skills at the end of first grade will be in the bottom 10%, or in the median 10%. It is not until the end of first grade that the developmental reading trajectories are distinct and non-overlapping. As we have just seen, however, by the end of first grade and beginning of second grade, students on low developmental reading trajectories face nearly insurmountable obstacles to catching up with their peers. The answer lies in the early identification of children with deficits in crucial early literacy skills and enhancing their acquisition of those skills.

Enhancing the Acquisition of Early Reading Skills

The converging evidence in beginning reading regarding *what to teach* and *what to assess* to enhance the acquisition of early reading skills is summarized in this section. Fortunately, an emerging body of intervention research demonstrates reliable parameters for determining the components of effective early reading instruction. Converging conclusions from multiple sources, including the National Center to Improve the Tools of Educators (Kameenui, 1996), the NICHD (Grossen, 1997), and

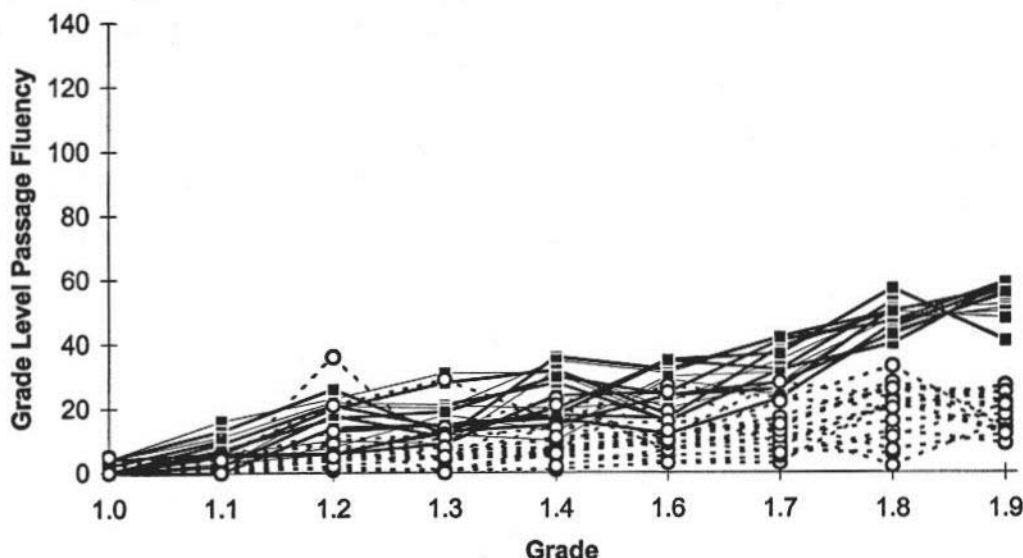
integrated research reviews (e.g., Adams, 1990; Chard, Simmons, & Kameenui, in press; Smith, Simmons, & Kameenui, in press; Torgesen & Hecht, 1996) are presented.

Area 1: Phonological Awareness

Fundamental to early reading success is a facility with the sound structure of our language. Phonological awareness as defined by Torgesen (Torgesen & Hecht, 1996) is "one's sensitivity to, or explicit awareness of, the phonological structure of words in one's language" (p. 136). Although research has not definitively concluded which dimensions of phonological awareness (e.g., segmentation, identity, blending) are obligatory for early reading, converging evidence underscores the importance of explicit phonological awareness instruction prior to formal alphabetic awareness instruction, especially for children with deficits in this area (Smith et al., in press). There is no question that students low in phonological awareness are at risk for reading failure and that phonological awareness instruction can ameliorate that risk. Smith's et al., (in press) synthesis of phonological awareness research identified six prevailing findings:

1. Phonological processing explains significant differences between good and poor readers.
2. Phonological awareness may be a group of highly related, distinct phonological abilities or a general ability with multiple dimensions.
3. Phonological awareness has a reciprocal

Figure 3. First grade reading trajectories of lowest 10 percent ($n = 19$) and middle 10 percent ($n = 16$) of readers as measured by oral reading fluency on grade level passages.



relation to reading acquisition.

4. Phonological awareness is necessary but not sufficient for reading acquisition.

5. Phonological awareness deficits and delays can be reliably identified in young children.

6. Phonological awareness is teachable and promoted by attention to instructional variables.

Area 2: Alphabetic Understanding

Alphabetic understanding is concerned with the "mapping of print to speech" and establishing a clear link between a letter and a sound. In her review of word recognition research, Juel (1991) cited eight studies that provide considerable evidence of the importance of alphabetic understanding in accounting for differences between good and poor readers. Reliable and efficient letter-sound or grapheme-phoneme correspondence is a critical building block for efficient word recognition (Chard et al., in press).

Area 3: Phonological Recoding

Vandervelden and Siegel (1997) defined phonological recoding as "the use of systematic relationships between letters and phonemes to recognize the printed match of a spoken word or syllable, to retrieve the pronunciation of an unknown printed string, or to spell" (p. 64).

According to Vandervelden and Siegel, phonological recoding involves a developmental progression. Easiest in the progression is the speech-to-print task in which children hear a word, *frog*, and match it with one of three printed words (e.g., *sad*, *mitt*, *frog*). Later in the progression, children use letter-sound correspondences and their positions in sequences to spell and read words. In initial phonological recoding readers recode letter strings into their corresponding sounds and blend the stored sounds into words, overtly and slowly. As children learn to distinguish each sound, they begin, sometimes laboriously, to decode written words by attending to every letter. With redundancy and practice, word recognition efficiencies increase. Phonological recoding has an inverse relationship with the frequency of the words to be recognized in reading. When readers encounter unfamiliar words, they rely on the phonological properties to recognize the word. Familiar words are activated interactively through semantic, orthographic, and phonologic processors (Adams, 1990). It is in the presence

of less familiar words that phonological recoding becomes of paramount importance (Chard et al., in press).

A primary issue of current investigation is the level or unit of phonological recoding (i.e., sequential segmentation of each phoneme or a combination of phoneme and orthographic components like *b—at*). The effect of orthographic sensitivity to word parts upon word recognition speed has prompted considerable, yet somewhat divergent research findings (Chard et al., in press). Ehri's (1991) review of 16 studies indicated that orthographic sensitivity follows automatic phonological recoding skill and repeated reading of phonologically regular and irregular words sharing the same patterns. Other studies show that skilled readers become sensitive to rule-governed word parts as opposed to word parts that occur frequently but do not adhere to alphabetic rules.

Area 4: Accuracy and Fluency with Connected Text

Not surprisingly, less skilled readers' comprehension continues to be highly dependent upon word recognition skills (Stanovich, 1991). Readers who are not yet facile at phonological recoding fail to recode words in meaningful groups and, therefore, are less likely to maintain the meaning of a clause or sentence in short-term memory (Adams, 1990). Thus, poor word recognition appears to limit (a) storage of and access to word meanings, and (b) ability to access or remember sequences of words (Chard et al., in press).

A first step in enhancing early reading acquisition is identifying *what to teach*. The essential skills of phonological awareness, alphabetic understanding, phonological recoding, and accuracy and fluency with connected text can be enhanced by making them instructional priorities in the early grades. To realize optimal benefit, however, these instructional priorities must be taught through validated methods. In the following section, we profile the interface of *what to teach* and *how to teach* using phonological awareness as the example focus area. We focus on phonological awareness for two reasons. First, phonological awareness assumes a pivotal role in establishing a developmental reading trajectory toward literacy. Second, the importance of phonological awareness in early literacy instruction is unequivocal,

but underestimated by teachers and teacher trainers. In fact, phonological awareness has been referred to as the "missing foundation of teacher education" (Moats, 1995, p. 9).

How to Teach Phonological Awareness

With respect to phonological awareness interventions, general principles of effective instruction have been identified. In addition, published curricula are available with published research evidence of their efficacy.

Criteria for Selecting Phonological Awareness Programs

We have valid, reliable, and warranted evidence regarding how to teach phonological awareness skills. Smith et al. (in press) synthesized the results of 25 intervention studies conducted from 1985 to 1996. Five features characterize effective interventions in phonological awareness. These features can function as a consumer's guide to selecting phonological awareness programs with a high likelihood of success. Of course, these criteria are not a substitute for research evidence of the efficacy of the program.

1. Provide instruction at the phoneme level. Instruction at the phoneme level is obligatory for children with phonological awareness deficits because the phoneme level bears a critical relation to beginning reading, does not develop easily without instruction, and is problematic for those students with phonological deficits or delays (e.g., Lyon, 1995). Often programs begin with larger, meaningful units such as words in sentences and progress to instruction at the phoneme level through smaller units such as syllables (e.g., Adams, Foorman, Lundberg, & Beeler, 1997). Instruction designed for young preschoolers may remain at the larger levels; however, it is important that instruction intended for mid to late kindergarten and older children prioritize competence on the phoneme level.

2. Scaffold tasks and examples according to a range of linguistic complexity. Scaffolding the linguistic difficulty of tasks and examples entails the gradual and intentional adjustment of linguistic complexity from easier to more difficult. Scaffolding mediates the complexity of phonological awareness acquisition by making the phonological features of language accessible.

Word features and task requirements affect the linguistic complexity of a phonological awareness task. Examples of word features include the length of words (longer words are more difficult), the number of consonant clusters in a word (more clusters are more difficult), and articulatory features of the sounds (continuous sounds like /m/ are easier than stop sounds like /t/). Task requirements include the position of phonemes in words (initial position is easiest, then final, then medial) and the size of the phonological unit being manipulated.

Instruction that scaffolds linguistic complexity provides orchestrated instructional examples designed to enhance learning. Scaffolding examples would focus first on short words, first sounds, continuous sounds, and without clusters of consonants. Moreover, sufficient examples would be provided to illustrate and provide practice for each instructional target such as identifying a specific phoneme or recognizing the position of phonemes in words. For example, children would practice identifying multiple examples of a specific phoneme in a specific position before receiving instruction and practice for a different phoneme in the same position.

3. Explicitly model phonological awareness skills prior to student practice. Provide students with generous opportunities to produce isolated sounds orally during practice. An initial explicit model of strategies represents a type of teacher scaffold. Graduated teacher assistance in the form of explicit models and guided practice is critical for children who experience difficulty attending to the phonologic features of language. Generous opportunities to pronounce isolated sounds is theorized to provide kinesthetic cues for sounds—important for children who have difficulty perceiving and coding the sounds of language (e.g., Torgesen & Bryant, 1994).

The following teacher-student dialogue represents an example of explicit instruction in which the strategy is modeled by the teacher before students (a) are asked to produce the task and (b) are given multiple opportunities to produce the isolated sounds orally.

"The first sound in *baby* is /b/. What is the first sound in *baby*? [Child responds with /b/]. Say /b/ with me again. [Student responds with teacher saying /b/]. Yes, /b/ is the first sound in *baby*."

Many programs test the ability to perform a

phonological awareness task in contrast to explicitly teaching the task. "What is the first sound in *baby*?" is a common format for presenting phonological awareness tasks. This format lacks an explicit model for identifying the first sound and an explanation of the task.

4. Provide systematic and strategic instruction for identifying sounds in words, blending and segmenting, and culminate with integration of phonological awareness and letter-sound correspondence instruction. The dimensions of phonological awareness that have received research support for bearing a critical relation to beginning reading include blending, segmenting, and identifying phonemes in words (e.g., Vandervelden & Siegel, 1995). Effective phonological awareness instruction transitions to explicit reading instruction with the strategic integration of letter-sound correspondence after several weeks of strictly auditory instruction (e.g., Torgesen & Davis, 1996). However, programs for very young preschoolers may not include the integration of letter-sound correspondence instruction because transitions to explicit reading instruction occur in kindergarten and first grade.

5. Use concrete materials to represent sounds. Concrete materials scaffold the difficulty of phonological awareness by attending to the transitory nature of sound, the abstract characteristic of isolated sounds, and the need to hold phonologic information in memory. Concrete materials scaffold phonological awareness by providing a common visual focus for attention between the child and the teacher, materials for a kinesthetic activity employed to represent mental manipulation of sounds, and an aid to memory. The range of materials used for concrete representation in intervention research included a series of rectangles to represent sound segments in words, manipulable items to move during a kinesthetic activity such as moving disks to represent segmentation, and pictures to represent words. For example, programs often employ a variation of the Elkonin rectangles in which objects are moved into boxes as single sounds are pronounced.

Research-Based Phonological Awareness Programs

Interventions that conform to the criteria of effective programs are desirable, but even more

desirable is research evidence of a program's effectiveness with target children. The following are examples of commercially available phonological awareness programs that are research-based with evidence of their effectiveness demonstrated with respect to later reading outcome measures. These programs are designed for young children, preschool through second grade. All the programs meet at least four of the five criteria previously discussed. Although not all of the programs provide instruction for identifying phonemes, blending, and segmenting, all of these programs provide instruction in at least one of those three skills. Complete citations are listed in the References section of this article: *Sound foundations* (Byrne & Fielding-Barnsley, 1991); *Phonological awareness training for reading* (Torgesen & Bryant, 1994); *Phonemic awareness in young children: A classroom curriculum* (Adams, Foorman, Lundberg, & Beeler, 1997); and *Ladders to literacy: An activity book for kindergarten Children* (O'Connor, Notari-Syverson, & Vadasy, 1997).

Evaluating the Acquisition of Early Reading Skills: Linking Assessment to Intervention to Outcomes

The selection of phonological awareness programs that document effectiveness for most children or that meet the criteria drawn from phonological awareness intervention research provides an initial basis to guide program selection decisions. However, two problems remain. First, evidence for program effectiveness is essential for *each* program implementation. Local characteristics may vary, the programs may not be implemented with sufficient fidelity to attain desired outcomes, or the great ideas that work in controlled environments may not work in practice. The stakes are too high for educators to implement great ideas and hope for the desired outcomes. Wrong guesses can affect the learning, success, and life outcomes for our children. We need evidence to show our constituents and ourselves that what we are doing is having the desired effect. Second, we know that not all children with phonological awareness deficits benefit sufficiently, even from these research-based interventions (e.g., Blachman, 1994). However, these are the very children most in need of early effective intervention. "For these children, we have not a classroom moment to

waste" (Adams, 1990, p. 90). We need direct measures of early literacy skills to assess student progress and make formative intervention decisions to ensure desired outcomes for all students.

Our thesis is that effective academic interventions are predicated on the linkage of assessment to intervention. However, many current assessment practices in the area of early literacy and readiness are not equal to the challenge because they (a) assess reading indirectly using latent constructs hypothesized to be related to reading, (b) assess performance infrequently, and (c) do not assess student progress. Instead, dynamic indicators of basic early literacy skills are needed to provide a basis for linking assessment with intervention to enhance outcomes.

Dynamic Indicators of Basic Early Literacy Skills

Addressing the flaws in current assessment procedures for early identification and early intervention requires more than just a new test; it requires a different approach to assessment. In particular, assessment procedures are needed to (a) identify children early who are experiencing difficulty acquiring early literacy skills, (b) contribute to the effectiveness of interventions by providing ongoing feedback to teachers, parents, and students, (c) evaluate the effectiveness of interventions for individual students, (d) determine when student progress is adequate and further intervention is not necessary, (e) identify accurately children with serious learning problems, and (f) evaluate the overall effectiveness of early intervention efforts.

To accomplish these purposes, Dynamic Indicators of Basic Early Literacy Skills (DIBELS) have been developed by a team of researchers at the University of Oregon (Good & Kaminski, 1996; Kaminski & Good, 1996; Kaminski & Good, in press). The rationale, procedures, and criteria for developing DIBELS parallels that of curriculum-based measurement (CBM) (Deno, 1992), with some exceptions described in Kaminski & Good (in press). First, DIBELS measures should be *dynamic* allowing a continuing evaluation of students' literacy skills as they change with the passage of time. They also must be sensitive to changes in student performance as a result of effective interventions. Dynamic measures of student change must be

easy to administer, capable of repeated and frequent administration, and time efficient and cost effective.

Second, DIBELS need to be *indicators*—representative of, or correlated with, important skill areas. Like CBM, DIBELS are intended to provide educators with "indicators of 'vital signs' of growth in basic skills comparable to the vital signs of health used by physicians" (Deno, 1992, p. 6). DIBELS are not intended to be exhaustive of all important skill areas for young children, but to provide a fast and efficient indication of the academic well-being of students with respect to important early literacy skills. Low performance on these measures would not be expected to identify all problem areas, but would indicate that educators should be concerned about the child's progress. As an indicator, DIBELS should be reliable and valid with respect to other measures of risk and early literacy.

Finally, DIBELS measures of *basic early literacy skills* are needed. Measures of basic early literacy skills need to satisfy two criteria. First, the measures should have predictive validity with respect to future reading performance. Second, and even more importantly, the measures should be functionally related to reading acquisition; instruction and acquisition of the skills should be causally related to success in early reading acquisition. While measures meeting both criteria are most desirable, measures that satisfy the first criterion only can still be helpful for some purposes. Phonological awareness measures, in particular, have emerged as strong predictors of later reading skills that are causally related to reading success. Two DIBELS measures of phonological awareness have been developed and validated for use with children in kindergarten and early first grade. For a discussion of other DIBELS measures and their relation to literacy acquisition, see Kaminski and Good (1996).

Phoneme Segmentation Fluency (PSF) is a DIBELS measure of phonological awareness intended for children in winter of kindergarten through fall of first grade. In PSF, children are asked to segment a spoken word into its component sounds. For example, if the spoken word was "fish," a child would say the sounds /f/ /i/ /sh/. The child receives credit for each correct sound segment of the word produced. Thus, if the child says /f/, he or she would receive credit for 1 correct sound segment. If the child says /f/ /ish/ they would receive credit for 2 correct sound segments. Complete segmentation would receive

credit for 3 sound segments. The task is timed, and the number of correct sound segments per minute is computed.

A single PSF probe consists of 10 words and takes about 3 minutes to administer and score. A set of 20 probes is available, with each probe consisting of a random sample of 10 words from a pool of 2 and 3 phoneme words selected from early reading curricula and language word lists. A single probe has a reliability of .88, and the average of 3 probes has a reliability of .96. The one-year predictive validity with reading outcome measures ranges from .73 to .91 (Kaminski & Good, in press).

Onset Recognition Fluency (OnRF) is another DIBELS measure of phonological awareness intended for children in late preschool through the winter of kindergarten. A single OnRF probe consists of 16 items. A recognition response is required for 12 items, in which the child is presented with 4 pictures and asked, for example, "Which picture begins with /b/?" A production response is required for 4 items, with the child shown a picture of a hat, for example, and asked, "What sound does 'hat' begin with?" Again, 20 probes are available, each an alternate form constructed by random sampling from a pool of items. The reliability of a single probe is .65, and the reliability of the average of 5 probes is .90. The concurrent validity of OnRF with PSF ranges from .44 to .60 (Kaminski & Good, in press).

Evaluating Student Progress

Direct measures of the slope of student progress when provided with instruction are crucial in evaluating a child's risk for reading failure and for evaluating the effectiveness of early interventions. Using direct and frequent measures of early literacy skills, the extent to which a child's skills are changing can be examined. A child who is rapidly acquiring early literacy skills will exhibit a large positive slope. A child who is making little progress will display a slope near zero. Considering the slope of student progress is essential for evaluating the effectiveness of an intervention for an individual child: An intervention is effective if it results in an increase in the slope of student progress. Consequently, a measurement system that assess response to instruction must be used instead of static measures of what a student knows (Howell, 1986). No matter how great an intervention

sounds, no matter how much it costs, no matter how much research has been published, and no matter how many criteria or belief systems it satisfies, if the intervention does not change the child's trajectory, then it is not effective for that child and a change is indicated.

Early, effective intervention is especially urgent for those children who experience difficulty acquiring early literacy skills like phonological awareness and letter-sound correspondence even with effective, research-based interventions. While some have termed these children "non-responders," or "treatment resisters" (e.g., Blachman, 1994) we prefer the term "children-for-whom-an-effective-intervention-has-not-yet-been-implemented," although it is a bit of a mouthful. A two-thirds response rate is not good enough: our goal is all. The consequences of reading failure are too serious, pervasive, and lifelong to settle for less. For children-for-whom-an-effective-intervention-has-not-yet-been-implemented, mobilizing sufficient instructional resources to identify, design, and implement an effective intervention is urgent. A problem-solving model of assessment for educational decisions based on the DIBELS measures is described elsewhere (Good & Kaminski, 1996).

Enhancing and Evaluating Early Reading Acquisition: The Big Ideas

While many children learn to read regardless of the instructional methods and procedures used by educators, many children will learn *because* of what and how we teach. As the number of learners with diverse needs continues to increase, we can expect the importance of instruction to increase as well. Kindergarten and first grade are times of unprecedented opportunity. If students can complete their first two years of school with adequate early reading skills, on a trajectory toward literacy, an important step toward a successful school experience will have been attained. Perhaps never before has the education profession had at its disposal such validated principles and practices to inform instructional decisions, alter achievement trajectories, and achieve this vision. In this article we have focused on some big ideas to help guide instruction and assessment:

1. Establish early reading acquisition as an urgent priority.
2. Target phonological awareness as a core

component of early effective interventions.

3. Employ research-based principles as a guide to selecting instructional programs and interventions.
4. Establish an intervention/evidence feedback loop.
5. Expect intervention to change developmental reading trajectories.

The linkage of assessment and intervention is essential to accomplish this vision. The history of education is replete with examples of intuitively and theoretically appealing innovations that failed to achieve their espoused effects. Whether it is teaching to students' learning modalities (Kavale & Forness, 1987) or California's abandoning skills teaching in the late 1980s and embracing a whole language approach (Honig, 1996), adopting instructional methods and innovations that lack efficacy can have profound and enduring effects. No matter how great the idea or how compelling the research, if an intervention is not working, something must change. Theory and prior research are extremely valuable tools for selecting and designing interventions, but the empirical criterion is paramount.

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