What to Do with Data Webinar
October 6, 2009

Task 3

Research-Based Strategies Packet
for
San Ejemplo Unified School District

DRAFT

The Center
FOR COMPREHENSIVE SCHOOL
REFORM AND IMPROVEMENT

LEARNING POINT
Associates®

RESEARCH BRIEF

www.centerforcsri.org

March | 2009

A Road Map for Mathematics Achievement for All Students

FINDINGS FROM THE NATIONAL MATHEMATICS PANEL

By Carolyn Brown, Ph.D., Research Director for The Center

What can we learn from the National Mathematics Panel Report that can help to improve mathematics achievement among American students?

The Study

Foundations for Success: The Final Report of the National Mathematics Advisory Panel (2008). Washington, DC. U.S.: Department of Education. http://www.ed.gov/about/bdscomm/list/mathpanel/report/final-report.pdf

Methodology

In 2007, the federal government appointed a group of education professionals, researchers, and stakeholders to study and advise on ways to "foster greater knowledge of an improved performance in mathematics among American students…with respect to the conduct, evaluation and effective use of the results of research relating to proven-effective and evidence-based mathematics instruction…based on the best available scientific evidence" (National Mathematics Advisory Panel, 2006). The charge was aimed at preparing students to be successful in algebra at the high school level.

This executive order defined a set of topics for the National Mathematics Panel to examine:

- **CURRICULAR CONTENT AND INSTRUCTIONAL MATERIALS.** What is the essential content of school algebra and what do children need to know before starting to study it? How should published materials present the curricular content?
- **LEARNING PROCESSES.** What is known from research about how children learn mathematics?
- **INSTRUCTION.** What is known about the effectiveness of instructional practices?
- **TEACHERS AND TEACHER EDUCATION.** How can we best prepare, recruit, retain, and provide ongoing development for effective teachers of mathematics?
- **ASSESSMENTS.** How can we make assessments of mathematical knowledge more accurate and more useful?

The National Panel reviewed more than 16,000 research publications and policy reports and received public testimony from 110 people, including parents, teachers, school administrators, board of education members, educational researchers, textbook publishers, and others interested in improving mathematics education. In addition, the panel reviewed written commentary from 160 organizations and individuals and analyzed survey results from 743 active teachers of algebra.

In Brief

The National Panel outlined six overarching recommendations as a comprehensive approach to mathematics education. This research brief will focus on the first three topics and the recommendations for PK–12 education.

Panel Findings

CURRICULAR CONTENT AND INSTRUCTIONAL MATERIALS. The K–8 mathematics curriculum should be streamlined to emphasize the most critical topics in the early grades.

Recommendations:

- State algebra standards should include the Major Topics of School Algebra as defined by The National Panel, along with a thorough outline of mathematical connections among these topics. [See the text box, "Major Topics of School Algebra," for more information.]

- The curriculum at the elementary and middle school levels must require fluency in the Critical Foundations of Algebra as defined by The National Panel. [See the text box, "Benchmarks for Critical Foundations of Algebra," for more information.]

- Benchmarks for the Critical Foundations of Algebra should drive curricula, instruction, and assessment, and be interpreted with flexibility to meet the needs of all students.

- Mathematics instruction must be presented in a focused, coherent sequence that builds on proficiency in key topics from year to year. Repetitive, spiraled curriculum should be avoided.

- School districts should ensure that students have access to an algebra course, preferably in Grade 8.

- States and districts must have curricula and materials that are sequenced and articulated across grade levels.

LEARNING PROCESSES. Rigorous research on how children learn should drive mathematics instruction by recognizing the advantages of a strong start for young children; integrating conceptual understanding, procedural fluency, and automatic recall of facts; and emphasizing that effort, not just inherent talent, leads to achievement in mathematics.

Recommendations:

- Instruction in computational estimation and concepts of rounding and estimating must be emphasized.

- Fractions, decimals, and percents—both conceptual and procedural knowledge—must be taught to mastery.

- Teachers should include explicit instruction to teach spatial visualization skills in elementary schools.

- Teachers and educational leaders must emphasize the vital role of effort (as opposed to natural talent) in mathematics achievement.

- Schools need to emphasize task engagement and self-efficacy in mathematics—factors that have been recognized in research as particularly effective in improving achievement for African-American and Hispanic students.

Major Topics of School Algebra

SYMBOLS AND EXPRESSIONS
- Polynomial expressions
- Rational expressions
- Arithmetic and finite geometric series

LINEAR EQUATIONS
- Real numbers as points on the number line
- Linear equations and their graphs
- Solving problems with linear equations
- Linear inequalities and their graphs
- Graphing and solving systems of simultaneous linear equations

QUADRATIC EQUATIONS
- Factors and factoring of quadratic polynomials with integer coefficients
- Completing the square of quadratic expressions
- Quadratic formula and factoring of general quadratic polynomials
- Using the quadratic formula to solve equations

FUNCTIONS
- Linear functions
- Quadratic functions—word problems involving quadratic functions
- Graphs of quadratic functions and completing the square
- Polynomial functions (including graphs of basic functions)
- Simple nonlinear functions (e.g., square and cube root functions, absolute value, rational functions, step functions)
- Rational exponents, radical expressions, and exponential functions
- Logarithmic functions
- Trigonometric functions
- Fitting simple mathematical models to data

ALGEBRA OF POLYNOMIALS
- Roots and factorization of polynomials
- Complex numbers and operations
- Fundamental theorem of algebra
- Binomial coefficients (and Pascal's Triangle)
- Mathematical induction and the binomial theorem

COMBINATORIES AND FINITE PROBABILITY
- Combinations and permutations as applications of the binomial theorem and Pascal's Triangle

Source: National Mathematics Advisory Panel, 2008
NOTE: These topics were derived from a review of state standards for Algebra I and II, mathematics textbooks, National Assessment of Educational Progress Algebra Objectives 2005, American Diploma Project's benchmarks for a high school exit test, and the algebra standards in Singapore.

INSTRUCTION. High-quality instruction uses both student-centered and teacher-centered strategies.

Recommendations:

- High-quality research supports a mix of student-centered and teacher-centered instruction.
- Regular formative assessment (weekly or biweekly) should be used, especially in the elementary grades.
- Districts and schools need to provide teachers with training on how to use formative assessment to differentiate instruction.
- Students with learning disabilities need regular, explicit, systematic instruction in areas such as computational fluency, translation of word problems, and mastery of foundational concepts.

Benchmarks for Critical Foundations of Algebra

FLUENCY WITH WHOLE NUMBERS

- By the end of Grade 3, students should be proficient with the addition and subtraction of whole numbers.
- By the end of Grade 5, students should be proficient with multiplication and division of whole numbers.

FLUENCY WITH FRACTIONS

- By the end of Grade 4, students should be able to identify and represent fractions and decimals, and compare them on a number line or with other common representations of fractions and decimals.
- By the end of Grade 5, students should be proficient with comparing fractions and decimals and common percents and with the addition and subtraction of fractions and decimals.
- By the end of Grade 6, students should be proficient with multiplication and division of fractions and decimals.
- By the end of Grade 6, students should be proficient with all operations involving positive and negative integers.
- By the end of Grade 7, students should be proficient with all operations involving positive and negative fractions.
- By the end of Grade 7, students should be able to solve problems involving percent, ratio, and rate and extend this work to proportionality.

GEOMETRY AND MEASUREMENT

- By the end of Grade 5, students should be able to solve problems involving perimeter and area of triangles and all quadrilaterals having at least one pair of parallel sides (i.e., trapezoids).
- By the end of Grade 6, students should be able to analyze the properties of two-dimensional shapes and solve problems involving perimeter and area, and analyze the properties of three-dimensional shapes and solve problems involving surface areas and volumes.
- By the end of Grade 7, students should be familiar with the relationship between similar triangles and the concept of the slope of a line.

Source: National Mathematics Panel Report, 2008
NOTE: These were based on review of skills and concepts in Grades 1 through 8 curricula of the highest performing countries on the Trends in International Mathematics and Science Study, the National Council of Teachers of Mathematics *Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics: A Quest for Coherence,* K–8 mathematics curriculum frameworks for the six highest rated state curricula, a 2007 American College Testing (ACT) survey, and a panel-sponsored survey of 743 teachers of introductory algebra across the country.

- Computer-assisted instruction for drill and practice should be considered a useful tool for developing fluency in mathematical skills and in teaching specific content to special populations.
- Computer programming should be considered as an effective tool for developing specific mathematics concepts, applications, and problem solving, particularly in elementary grades.
- Mathematically gifted students should be allowed to progress through the curriculum at an accelerated rate.

Suggestions for School District Improvement

Many of the findings and recommendations from The National Panel will ring true for classroom teachers, school administrators, and education researchers. This careful and comprehensive analysis of the most rigorous

research and professional expertise provides a guideline for what schools and districts can do to improve mathematics achievement for all students:

- Make sure the district curriculum is carefully sequenced across all grade levels to include the Critical Foundations of Algebra as defined by The National Panel. District mathematics curriculum coordinators should focus on assuring that all important skills and concepts are taught to mastery and that the curriculum is streamlined to reduce repetition.

- Teachers should emphasize the importance of student effort, task engagement, and self-efficacy in mathematics, especially for African-American and Hispanic students.

- Fractions, decimals, percents, spatial visualization, and computational estimation and rounding should be introduced in the appropriate sequence and taught to mastery in the elementary years. [See the text box, "Benchmarks for Critical Foundations of Algebra" for more information.]

- Algebra should be provided for all eighth graders.

- Regular, formative benchmark assessment should be administered at all grade levels.

- Students with learning needs can be supported through explicit and computer-assisted instruction.

- Gifted students should be allowed to progress at their own rate.

Challenges

The National Panel found that teachers who were knowledgeable in mathematics, particularly in the varied and specific teaching methods in mathematics, were the most effective teachers. More development is needed in the area of professional development and preservice preparation to produce a cadre of highly qualified mathematics teachers. Also, very little research was found that addressed the teaching of fundamental mathematics in early childhood education.

A shift needs to occur in the way teachers, students, and parents think about learning mathematics. Ideas about mathematics achievement being a matter of natural ability must be cast off, along with schools' practices of reserving algebra for the high achievers. All students must receive preparation, beginning in prekindergarten, for algebra and other advanced mathematics topics.

Bottom Line

To produce a generation of students who can compete globally will require schools to prioritize the effective teaching of mathematics, including articulating curriculum, streamlining textbooks, producing challenging examinations, and training teachers in the skills needed to instruct students for high achievement. By focusing on clear steps and procedures that will prepare students to master algebra, this report points the way to a future of mathematics achievement for American students that will help America maintain its position as a center for cutting edge science, technology, engineering, and mathematics research and development.

Other Resources

Ashby, C. (2006). *Science, technology, engineering and math trends and the role of federal programs: A report to the Committee on Education and the Workforce, U.S. House of Representatives* (GAO-06-702T). Washington, DC: U. S. Government Accountability Office.

Bjork, R. A. (1994). Memory and meta-memory considerations in the training of human beings. In J. Metcalfe & A. Shimamura (Eds.), *Metacognition: Knowing about knowing* (pp. 185–205). Cambridge, MA: MIT Press.

Business Higher Education Forum. (2005). *A commitment to America's future: Responding to the crisis in mathematics and science education.* Washington, DC: Author.

Daro, P., Stancavage, F., Ortega, M., DeStefano, L., & Linn, R. (2007). *Validity study of the NAEP mathematics assessment: Grades 4 and 8* (Chapters 2 and 3). Washington, DC: American Institutes for Research. Retrieved on March 31, 2009 from, http://www.air.org/publications/documents/NAEP_Math_Validity_Study.pdf

Duschl, R. A., Schweingruber, H. A., & Shouse, A. W. (Eds.). (2007). *Taking science to school: Teaching and learning science in Grades K–8.* Washington, DC: National Academies Press.

Evan, A., Gray, T., & Olchefske, J. (2006). *The gateway to student success in mathematics and science.* Washington, DC: American Institutes for Research.

Ginsburg, A., Cooke, G., Leinwand, S., Noell, J., & Pollock, E. (2005). *Reassessing U. S. international mathematics performance: New findings from the 2003 TIMSS and PISA.* Washington, DC: American Institutes for Research.

Hecht, S. A., Vagi, K. J., & Torgesen, J. K. (2007). Fraction skills and proportional reasoning. In D. B. Berch & M. M. M. Mazzocco (Eds.), *Why is math so hard for some children? The nature and origins of mathematical learning difficulties and disabilities* (pp. 121–132). Baltimore: Paul H. Brooke.

Horn, L., & Nuñez, A. (2000). *Mapping the road to college: First-generation students' math track, planning strategies, and context of support* (NCES 2000-153). Washington, DC: U.S. Department of Education.

Kilpatrick, J., Swafford, J., & Findell, B. (2001). *Adding it up: Helping children learn mathematics.* Washington, DC: National Academies Press.

Mazzocco, M. M. M., & Devlin, K. T. (2008). Parts and holes: Gaps in rational number sense among children with vs. without mathematical learning disabilities. *Developmental Science. 11*(5), 681–691.

Morrissett, L. D., & Vinsonhaler, J. (1965). *Mathematical learning: Report of a conference sponsored by the Committee on Intellective Processes Research of the Social Science Research Council.* Chicago: University of Chicago Press.

National Mathematics Advisory Panel. (2006). Executive Order 13398. *Federal Register* 20519, Vol. 71, No 77. Retrieved on March 31, 2009, from http://edocket.access.gpo.gov/2006/pdf/06-3865.pdf

National Council of Teachers of Mathematics. (2006). *Curriculum focal points for prekindergarten through Grade 8 mathematics: A quest for coherence.* Reston, VA: National Council of Teachers of Mathematics.

Phillips, G. W. (2007). *Chance favors the prepared mind: Mathematics and science indicators for comparing states and nations.* Washington, DC: American Institutes for Research.

Schmidt, W. H., & Houang, R. T. (2007). Lack of focus in mathematics: Symptom or cause? Lessons learned. In T. Loveless (Ed.), *What international assessments tell us about math achievement.* Washington, DC: Brookings Institution Press.

Shoenfeld, A. H. (1995). Report of working group 1. In C. B. Lacampagne, W. Blair, & J. Kaput (Eds.), *The algebra initiative colloquium, Vol. 2.* (p. 11). Washington DC: U. S. Department of Education.

Wu, H. (2007). *Fractions, decimals, and rational numbers.* Unpublished manuscript. University of California, Berkeley.

LEARNING POINT Associates®

Administered by Learning Point Associates in partnership with the Southwest Educational Development Laboratory (SEDL), under contract with the Office of Elementary and Secondary Education of the U.S. Department of Education.

The Center FOR COMPREHENSIVE SCHOOL REFORM AND IMPROVEMENT

1100 17th Street NW, Suite 500
Washington, DC 20036

P: 877-277-2744 > **W**: www.centerforcsri.org
P: 202-223-6690 > **F**: 202-223-8939

Practical Guidelines for the Education of English Language Learners

RESEARCH-BASED RECOMMENDATIONS FOR INSTRUCTION AND ACADEMIC INTERVENTIONS

David J. Francis, Mabel Rivera
Center on Instruction English Language Learners Strand
Texas Institute for Measurement, Evaluation, and Statistics
University of Houston

Nonie Lesaux, Michael Kieffer
Harvard Graduate School of Education

Hector Rivera
Center on Instruction English Language Learners Strand
Texas Institute for Measurement, Evaluation, and Statistics
University of Houston

This is Book 1 in the series Practical Guidelines for the Education of English Language Learners:
Book 1: Research-based Recommendations for Instruction and Academic Interventions
Book 2: Research-based Recommendations for Serving Adolescent Newcomers
Book 3: Research-based Recommendations for the Use of Accommodations in Large-scale Assessments

2006

RECOMMENDATIONS ON READING INSTRUCTION AND INTERVENTIONS FOR ELLS

Conceptual Framework

The conceptual framework for this section is based on a developmental perspective of reading, and is guided by five principles that relate to planning effective instruction and intervention for ELLs. A developmental perspective recognizes that there are many component skills that contribute to successful reading comprehension and there are many factors—individual, instructional, and contextual—that influence reading outcomes. In order to become good readers, students need to begin to master these skills early and to continue to develop them over time. By the upper elementary years, they must be able to read to learn, since text forms the basis for much of the delivery of the curriculum. The role of reading in the development of content-area knowledge and academic success is not unique to ELLs, but applies to all learners. This fundamental relationship between reading and knowledge acquisition in school forms the basis of the first guiding principle of this section of the report.

The crucial application for reading skills is to learn new concepts and develop new knowledge across a range of content areas. As early as the primary grades, readers begin to acquire a significant number of concepts and amount of knowledge through reading. This is especially important for ELLs, since reading is one platform for vocabulary development and knowledge acquisition. But, if a student—whether ELL or native English speaker—experiences reading difficulties that persist over time, she is likely to have a knowledge base and vocabulary that is insufficient for comprehension of texts in content-area classes in the middle and high school years, and for effective independent writing in content areas[13].

Reading comprehension skill—the goal of reading instruction and the precursor to academic success—is a multi-dimensional, complex process that requires that many skills be well-developed. Therefore, the second guiding principle is that, *in order to plan for effective instruction, educators must have a clear understanding of the specific sources of difficulty or weakness for individual students and groups of students.* Effective reading comprehension can be undermined by a number of factors, including word-reading accuracy and speed, vocabulary, understanding of text structure, the ability to use

language to formulate and shape ideas, and the ability to make inferences from text. Every reader needs to integrate and activate these various skills and strategies each time he is engaged with reading text, across many different types of texts. In turn, given the complexity of this process, the specific sources of learners' difficulties and weaknesses must be identified when planning for effective instruction and intervention.

Potential sources of comprehension difficulties are likely to be exacerbated for ELLs, especially difficulties that relate to higher-order language processing, such as unfamiliar vocabulary or understanding complex linguistic structures[14]. However, even if this is the case, there is still the need for an educator to engage in student assessment in order to identify the *specific* source of difficulty and the appropriate corresponding instructional approach or intervention to remedy the difficulty.

Related to effective assessment and instruction for struggling ELLs, the third guiding principle is that *ELLs—whether formally designated LEP or not—often lack the academic language necessary for comprehending and analyzing text.* Performance on national assessments demonstrates that ELLs struggle to achieve academically at the same levels as their native English-speaking peers. Most important, ELLs score below their native English-speaking peers both when they are participating in specialized language support programs and *after* they have been reclassified as having enough English proficiency to access the curriculum without specialized language support[15]. For example, in several studies[b] with ELLs—whether formally designated LEP or not—vocabulary levels are often well below average[16], sometimes with a group average as low as the 20th percentile. Such low vocabulary levels are insufficient to support effective reading comprehension and writing, and in turn have a negative impact on overall academic success.

Equally important to note is that many of the ELLs who struggle academically have well-developed conversational English skills. By the middle school years, ELLs rarely need instruction in basic conversational English, but they lack the academic English vocabulary to support learning from texts. Much of the language of academic texts is language that students only begin to encounter in the middle school years, and have never otherwise been exposed to[17]. It is important to remember that this exposure to more linguistically challenging text is often long after these learners have stopped receiving specialized language support.

[b] Data on ELLs after reclassification are less readily available and tend to come from studies by individual research teams rather than from large-scale, public-use data files of individual state databases and/or national studies. Although some state reports have been released that address this issue (see endnote 5), more widespread and systematic research is needed in this area.

As previously discussed, many facets of language are wrapped up in the notion of academic language, including vocabulary knowledge; understanding words of increasing complexity and length; and understanding complex sentence structures and discourse structures, including argumentation, narration, and exposition, and the corresponding syntax of the English language. Academic language becomes increasingly important with increasing years of schooling, as students read to acquire concepts, ideas, and facts in content-areas such as math, science, and social studies. In reading, students encounter many words that are not part of everyday classroom conversation; these are words like *determine*, *whereas*, and *factor*, that typically only appear in print and carry substantial weight in understanding and acquiring new knowledge from a given text[18].

The multi-dimensional nature of reading comprehension and the multiple factors that have an influence on this process are reflected in the fourth guiding principle of this section of the report. That is, *the great majority of ELLs experiencing reading difficulties struggle with the skills related to fluency, vocabulary, and comprehension.* Research indicates that the five core areas of instruction to promote reading development of native English speakers, namely phonemic awareness, phonics, fluency, vocabulary, and comprehension, similarly apply to reading instruction for ELLs[19]. The first two areas are critical during the earliest stages of reading development. However, the latter three are critical during all stages of reading development, and are especially important during skilled reading and when students are expected to read to learn.

Most ELLs do not demonstrate significant reading difficulties in the primary grades; only a small percentage of ELLs struggle with acquiring accurate and automatic word reading skills[20]. Yet, when the emphasis shifts from learning to read to reading to learn and text becomes central to the delivery of the curriculum and to overall academic success, they perform poorly on assessments of reading comprehension. That is, they can read words accurately, but they don't necessarily understand the meaning of the words as they relate to the passage or text. Given the emerging, but not robust, research in this area, it is not entirely clear what causes these comprehension difficulties in the face of well-developed word reading skills. However, there is a working consensus that for the great majority of struggling ELLs, their fluency, vocabulary, and other skills specific to comprehension (e.g., strategy use) are insufficient to support the effective understanding of text and its use for learning new content[21].

Fluency, vocabulary and comprehension are each multi-faceted[22] in nature and require the integration of specific cognitive (e.g., word-reading accuracy and efficiency, working memory) and sophisticated language skills (e.g., depth and breadth of vocabulary knowledge, syntactic awareness, and morphological awareness). Readers of this document who are familiar with the *National Reading Panel Report* (NRP, 2000) will note that the emphasis here on fluency, vocabulary, and comprehension as foundational skills in reading to learn is consistent with that report, despite the fact that the NRP excluded research that focused specifically on the literacy development of ELLs. The recently completed review of the *National Literacy Panel for Language Minority Children and Youth* (2006)[23] found that these three skills are also crucial to ELLs' academic success, yet they are an instructional challenge for educators. The similarity in the developmental and cognitive processes that underlie English literacy skills in ELLs and native speakers of English allows us to draw on a much larger research base to make specific recommendations related to instruction and academic interventions for ELLs who are struggling.

Thus, the final guiding principle is that *when planning instruction and intervention, there is a need to consider the function of the instruction (i.e., preventive, augmentative, or remedial).* The effectiveness with which a child develops into a proficient reader is very heavily dependent on factors that relate to her schooling experiences. The last three decades of reading research have taught us that many learners lack sufficient opportunities to learn; they experience a lack of exposure to appropriate instruction tailored to their own needs. For ELLs in particular, differences in opportunities to learn have an impact on their reading outcomes, and in many cases a stronger effect than that of second language learning. Given the patterns of achievement within the ELL population, there are many instructional strategies that are best implemented at the classroom level.

For example, academic language is an area of weakness for many ELLs, and their difficulties are known to persist over time. Moreover, native English speakers from all ethnic and socioeconomic backgrounds benefit from explicit instruction to develop academic language. Therefore, targeted, class-wide instruction in this area is warranted to augment the skills of learners in the overall population, and possibly prevent some of the difficulties ELLs have in this area. In contrast, there are other areas where students may be having difficulty but share those difficulties with only a few, if any, of their peers. In

this case, intervention is best delivered in a small-group or one-on-one setting and is considered supplemental for the purposes of this document.

The differing purposes of instruction and intervention (*preventive*, *augmentative*, *remedial*) combined with the varying needs within the ELL population, particularly by grade level, beg a local decision about whether a recommendation is best implemented as a class-wide strategy (i.e., preventive, augmentative), or as a supplemental strategy (i.e., remedial). Thus, the set of recommendations that follows includes the instructional principles for each area of focus, irrespective of the format that educators select as the most feasible and appropriate given the characteristics of their local student population.

Recommendations

The recommendations that follow reflect the need to strengthen and refine the existing educational system to better meet the needs of ELLs who are experiencing academic difficulties. The recommendations pertain to ELLs, whether designated LEP and receiving formal specialized language support or redesignated as fluent English proficient, and also pertain to ELLs whose proficiency in English was advanced enough to avoid formal LEP designation upon school entry.

For each recommendation, there is specific discussion of the typical instructional practices in the domain of focus, and the ways in which that practice needs to be strengthened to better meet the needs of all learners. There is also attention to the developmental nature of reading and language skills and the need for instruction to vary according to developmental stage, which, in the case of ELLs, may be determined in part by grade level, chronological age, and/or time in U.S. schools.

1. ELLs need early, explicit, and intensive instruction in phonological awareness and phonics in order to build decoding skills.

Having English as a second language does not necessarily result in difficulty acquiring word-reading skills. In fact, the great majority of ELLs in the primary grades develop word-reading skills that are commensurate to those of their native English-speaking peers. Research has demonstrated that, as early as kindergarten, it is possible to identify ELLs, from varying language backgrounds, who are at risk for reading difficulties because of underdeveloped phonological awareness skills and/or difficulty learning sound-symbol correspondences. These are learners who—like their native English speaking peers with early difficulties—have trouble "cracking the code."

However, there is a tendency within schools to overlook or delay addressing the possibility that ELLs are experiencing reading difficulties due to difficulties with language-processing skills and decoding print[24]. Instead, oral language proficiency is thought to be the cause of the difficulties and/or that these difficulties are characteristic of ELLs' reading development. In many cases, educators use a "wait and see" approach and hold off on intervention for ELLs, assuming that these skills will develop as they acquire more proficiency in English and experience increased exposure to print. We know from many years of research with native English speakers—and have more recently learned from research with ELLs—that learners who are experiencing these difficulties need explicit, intensive instruction and/or intervention in phonemic/phonological awareness and phonics. This intervention must be explicit, systematic, and intensive in order to augment students' abilities and prevent further difficulties[25]. Findings from several research studies suggest that approximately the same number of ELLs as native English speakers have difficulty with word-reading acquisition. Likewise, recent reviews have made clear the role of phonological awareness in reading acquisition in all alphabetical languages[26], while empirical studies have shown a very high degree of correspondence between phonological abilities across languages in ELLs[27].

These conclusions pertain to ELLs from all different language backgrounds—including learners with native languages that are non-alphabetic—and learners with differing levels of oral language proficiency. One's phonological skill in his native language are strongly related to his phonological skills in English, and in many cases these skills are much better developed than are children's higher order oral language skills (e.g., vocabulary, grammatical skill). For ELLs in the primary grades, there is a very weak relationship between phonological skills and vocabulary, with phonological skills typically much better developed than vocabulary skills, and more important to the development of word-reading accuracy. Whereas there is a need for a child to have a certain amount of vocabulary knowledge in order to receive phonics instruction, this is not the case for phonological awareness. ELLs, even in the very beginning stages of English language development, benefit from phonological awareness instruction and activities. Those ELLs who demonstrate difficulty developing these abilities, even as early as kindergarten, require extra instruction to support this development. Improved proficiency in English is not likely to remediate difficulties in understanding the sound structure of the language.

Therefore, delaying intervention until children gain increased proficiency in English is not advised. Here, it is also important to note that there is a strong relationship between phonological abilities in the first and second languages of individual children.

For children enrolled in native language instruction, it is not necessary that they receive additional, separate instruction in phonological awareness in English if their phonological awareness and literacy skills are developing in their native language[28]. For those children receiving native language literacy instruction whose literacy skills—including phonological awareness—are not developing, educators must decide whether to intervene in the language of instruction or to intervene in English. At present, there is little research to guide this decision in terms of differential impact of the two choices. Decisions should be based on the availability of high-quality effective interventions in the language of instruction, the principles of which are universal for alphabetic languages, and the capacity to deliver them effectively[29].

Supporting reading acquisition. Similar to best practices for native English speakers, districts and schools should consider two complementary formats for explicit, intensive, and systematic instruction and intervention in phonological awareness and phonics for ELLs. This approach would increase ELLs' opportunities to learn and provide them with a firm foundation for reading acquisition. These two formats are:

1) class-wide instruction for all learners and their classmates;
2) supplemental intervention for the subgroup of children who experience sustained difficulties despite effective class-wide instruction, and whose skills are significantly below their peers, whether ELLs or native speakers.

When selecting any intervention, there is a need for a very precise match between the child's source of difficulty and the intervention itself. The student's progress must be monitored over the course of the intervention in order to track growth and response to intervention. In addition, the educators involved with the learner must make a joint decision on the time of day for intervention and whether it will take place during regular class-wide instruction. For ELLs, this decision is particularly important because ELLs also need sufficient opportunities to develop proficiency in English and learn content-area material.

2. K-12 classrooms across the nation must increase opportunities for ELLs to develop sophisticated vocabulary knowledge.

Although there is variation in the nature and amount of vocabulary instruction occurring in classrooms across the U.S., this area of instruction has generally been neglected in efforts to support *all* learners' academic development. For several decades it has consistently been estimated that only about 5 to 10 percent of classroom instructional time is devoted to vocabulary instruction, and that most lessons do not contain any attention to word meanings and students' understanding of them[30]. Given the increasing number of ELLs in classrooms today, this is especially troubling. Whereas some classrooms include vocabulary instruction on a regular basis, most—especially in the middle and high school content-area classes—incorporate little, if any, systematic and explicit vocabulary instruction into the curriculum. When such instruction does occur, it is most often in the elementary years, the primary grades in particular, or in classes for beginning ELLs. Vocabulary instruction rarely occurs despite the fact that it is the academic language of middle and high school classrooms and texts that prove most difficult for ELLs and in spite of the fact that ELLs—and their classmates—need between 12 and 14 exposures to a word and its meaning, across multiple contexts (different texts, classroom discussions, writing activities), in order to gain deep understanding of a word[31].

While many ELLs need to be taught words—both the label for a word and the concept behind the word—there are also many ELLs who have a label for a word, but lack the deep conceptual knowledge about the word itself and the words that relate to it. Yet it is this conceptual knowledge that students need in order to develop their vocabulary and background knowledge, and to have access to vocabulary skills that support academic success.

When vocabulary instruction does occur, it often revolves around the definition of a particular word, either by presenting the word in a sentence that provides one of its meanings, or by having students look up its meaning in a dictionary or glossary. For many older learners, the focus is on words highlighted in the textbook; these word lists are often filled with rare and unusual words, such as *dandelion*, *burrowed*, or *bootlegging* that are not always the most important for comprehension, and can even detract from their learning[32]. These lists don't usually include many of the high-utility academic words such as *analyze* or *frequent*, or important function words such as *although* and *therefore*.

Our understanding of just how sophisticated and complex vocabulary knowledge is, combined with the data on the reading ability and academic achievement of ELLs, suggests that even when vocabulary instruction does occur, it falls far short of meeting the needs of most ELLs. These learners need very sophisticated vocabulary skills to thrive in content-area classrooms, and in turn to graduate from high school well prepared for post-secondary education.

Increasing and strengthening vocabulary instruction. In order to provide ELLs with access to content-area curriculum and in turn to increase their academic achievement, effective vocabulary instruction must be frequent, intensive, systematic, and complex. It must occur in all classrooms, from kindergarten through 12th grade, and be cohesive and consistent across the grade levels. Vocabulary instruction must be based on an understanding of:

- the differences between conversational language and academic language;
- the difference between having a word label and having knowledge of the concept behind the word; many ELLs have the label but lack any kind of deep conceptual knowledge of the word;
- how words relate to one another (word families) and can be transformed into different words through manipulation of word parts (roots, suffixes, affixes, prefixes);
- the interrelatedness of content-area knowledge and academic language;
- the various levels of word knowledge, including the need to know multiple meanings for many words;
- the need for vocabulary instruction to occur through oral, reading, and writing activities; and
- the need for students to be equipped with strategies to learn words independently.

There are many opportunities for vocabulary instruction in kindergarten through 12th grade classrooms; effective vocabulary instruction requires striking a balance between explicit teaching of individual words and teaching word-learning strategies. In the primary grades, teachers can use read-alouds combined with extended talk about words to teach new words, including more sophisticated words than those that students can read independently[33]. In the upper elementary years, teachers can introduce more sophisticated and increasingly academic vocabulary through texts, and increase the emphasis

on word-learning strategies[34]. In all schools, vocabulary instruction must extend beyond the English language arts classroom as students grapple not only with general academic words such as *analyze*, but also more specific content terms such as *estimate* or *Industrial Revolution*[35]. Throughout the grades, vocabulary instruction must provide multiple exposures to carefully and well-selected academic words in meaningful contexts. In turn, this type of instruction is likely to have an effect on students' reading comprehension skills.

3. Reading instruction in K-12 classrooms must equip ELLs with strategies and knowledge to comprehend and analyze challenging narrative and expository texts.

Typical comprehension instruction is mostly uni-dimensional and primarily involves students reading from a text and answering assigned questions that relate to the text or passage[36]. This instruction has an almost exclusive focus on the *products* of comprehension rather than the *process* of comprehension. For example, instruction has focused on product-oriented factors such as whether students learned the appropriate knowledge from the text or were able to grasp the main idea instead of more process-oriented factors such as the active strategies and conscious monitoring involved in negotiating text for meaning. This focus on the products of comprehension rather than the process of comprehension occurs for many reasons, but especially because the great majority of reading comprehension assessments are entirely product-driven; they require that students successfully answer questions following their reading of a text or passage. So it is understandable that, to some extent, this format has shaped comprehension instruction. However, the end result is that many students—particularly those with poor comprehension skills—read passively, often without conscious monitoring and strategy use, and understand reading comprehension to be a demonstration of knowledge after reading a text or passage[37]. Via specific questions—usually multiple choice format—students either succeed or fail to demonstrate what they've understood, and as a result, some students are deemed good comprehenders and others poor comprehenders.

This conception of the reading comprehension process is very narrow and not especially fruitful for improving students' abilities to work with and understand complex text. Within this format for instruction and assessment, neither teacher nor student is engaged in a structured conversation about constructing and extracting meaning from text, the use of appropriate

strategies to foster comprehension, the purposes for reading the text, or the aspects of the particular text genre being read and how this genre affects the strategies to be used. When the comprehension process is implicit and hidden, those ELLs who succeeded in answering the questions likely do not recognize or reflect upon how they comprehended them, while those who failed to answer the questions correctly are left without guidance as to how they might have been more strategic while reading.

Improving comprehension instruction. Instead, effective comprehension instruction for ELLs and their classmates must be explicit and direct, must actively engage the student in monitoring and carefully selecting and reflecting upon her own use of strategies during the comprehension process. Students must also understand how this process has to be adjusted for the type of text (e.g., expository or narrative) being read, the purposes for the reading (e.g., to learn about a science concept or to solve a math problem), and the format of the content (e.g., the format of instructions for a science lab or a primary document in social studies). When students are actively engaged, effective instruction promotes *meta-cognition*—students' ability to reflect on, monitor, and control their own thinking processes. There are several techniques which can be used to promote active reading and engagement with text, fostering better comprehension and a more thoughtful approach to the text, for example[38]:

- **Teaching students to make predictions consciously *before* reading.** When students make predictions before reading, they must recall what they know about the type of text to be read and anything they might know about the specific text or the topic it covers. Making predictions before reading also gives students an opportunity to check, and reflect on, their predictions while reading as well as after reading. Discussions of predictions that include teacher supports and scaffolds also provide an opportunity for students to gain an understanding of the purpose for reading the text.
- **Teaching students to monitor their understanding and ask questions *during* reading.** Monitoring understanding and asking students questions during reading cues students to recognize when their comprehension breaks down and to identify the knowledge (e.g., of a vocabulary word or a content concept) they need to repair their comprehension. Asking ELLs to explain their processes for making meaning while reading and strategies

to overcome difficulties is another method to increase opportunities to produce language.

- **Teaching students to summarize what they have read *after* reading.** Writers and speakers summarize because it requires them to synthesize what they have tried to communicate, distinguishing for their audience what is important from what is not. Similarly, having a reader summarize what he has read requires that he synthesize the information and differentiate between more and less important information.

These aspects of reading comprehension instruction have been shown to be important for native English speakers and relevant for ELLs, who need significant support to navigate and actively make meaning from text and who need opportunities for structured talk about text. Since their reading comprehension is often hampered by lack of academic language, which is strongly related to lack of content knowledge, these are also ways to promote language production and academic language, while working on comprehension skills and increasing ELLs' exposure to print. In addition to these techniques, writing activities before, during, and after reading can also provide ELLs with essential opportunities to strengthen comprehension as well as develop academic language.

Of course, *telling* ELLs to question, predict, monitor, and summarize is very different from *teaching* them to do so. Strategy instruction is most effective when taught within a framework that emphasizes a gradual release of responsibility to the student; teachers provide high levels of support for students practicing new skills and then gradually decrease support as students become more independent in using the strategy. Teachers typically begin by explaining the purpose and characteristics of a given strategy, and by extensively modeling their own strategy use, often through thinking aloud while reading a text, and provide many opportunities for structured practice, whether oral or written. Teachers must push students to use these strategies critically and purposefully when reading independently. This final step can sometimes be the most difficult. When the task requires students to transfer strategies to new contexts or apply strategies to new texts, many students have difficulty transferring and/or adapting the strategies to the new text or context.

For instance, middle school students taught to summarize a chapter from a novel in an English class may fail to do so when reading the social studies textbook, or may try to summarize the social studies text as if it were a

narrative by explaining the sequence of events rather than by identifying the main idea and key supporting details. For these reasons, comprehension instruction must be aligned across content areas *and* must teach students to recognize differences between types of texts and purposes for reading, as well as teach students how to adjust their strategies accordingly.

Though the elements and goals of effective comprehension instruction are largely the same across the grades, the use of text and the features of the texts themselves will be different at different grade levels. From kindergarten through second grade, while students are still acquiring word-reading skills, comprehension instruction must include a focus on books that are read aloud and discussed. Read-alouds provide essential opportunities for ELLs to develop and extend their language via structured talk with teachers and peers while the teacher supports the verbal interactions. Read-alouds that include modeling of explicit comprehension strategies (predicting, monitoring, summarizing) also prepare students to engage in active comprehension behaviors as they become readers of more sophisticated texts. By upper elementary school, effective comprehension instruction should provide opportunities for students to be strategic readers of a wider variety of texts, and should focus on the academic language and sentence structures that are key to comprehension. Following on the elementary years, the great challenge of the middle and high school years is for readers to become adept at reading an increasing variety of more sophisticated content-area texts, and more specifically to employ appropriate strategies for comprehension and word learning while reading independently[c].

4. Instruction and intervention to promote ELLs' reading fluency must focus on vocabulary and increased exposure to print.

Many readers in the upper elementary and middle school years who perform poorly on standards-based assessments of reading comprehension receive phonics instruction[39]. The assumption behind this practice is that if students increase their automaticity with decoding, they will read the text more quickly, and this will improve reading comprehension. Here it is important to make the distinction between rate and fluency. We use rate to refer to the speed with which students are able to read words, either in isolation or in context, whereas fluency embodies rate and students' ability to read connected text with appropriate (1) phrasing, (2) prosody, and (3) inflection, each considered an indicator of comprehension. To read with fluency, one must possess automaticity in word-recognition skills, but also have access to knowledge of

[c] For an in-depth discussion of the need for content-area literacy instruction and the principles of this instruction see the corresponding paper on Adolescent Newcomers.

word meanings and the ability to hold information in working memory while constructing and extracting meaning from text. The link between fluency and comprehension is bi-directional.

Individuals whose word-recognition skills are automatic can devote greater cognitive resources to comprehending the text. Furthermore, when readers encounter words in text whose meanings they do not know or do not understand in the context of the passage, reading rate and fluency decrease. In this case, comprehension or the lack thereof influences fluency, even if decoding is automatic. Thus, many ELLs who struggle with reading comprehension have *fluency* difficulties but their reading *rate* is within the average range. These same learners are not likely to show improvement in fluency following phonics instruction, and do not necessarily need more practice learning the code and increasing their decoding rate. Instead, their difficulties reflect underdeveloped vocabulary and insufficient exposure to print. Therefore, they would benefit from increased practice reading text that is at their instructional level (can be read with 90% accuracy), with the goal of developing deeper representations and more efficient access (lexical, syntactic, semantic) to the words and their meaning(s) in varying contexts[40].

Repeated reading is an empirically-based intervention whereby students practice orally reading instructional-level expository or narrative passages. Students practice reading a text until they can meet a pre-determined goal for oral reading fluency, read the passage with very few errors (number set by program or staff), and read with acceptable phrasing and expression. In most cases, adults (or peers, in a partner reading format) provide corrective feedback if words are not accurately decoded. In some repeated reading interventions, students' attention is focused on comprehension through pre-reading, prediction, and through requiring a written retell and/or completion of multiple choice questions about the passage. In emerging research with ELLs[41], this intervention has been successfully modified to attend to their needs by including oral discussions of vocabulary (two words per passage) and comprehension. In this model, the vocabulary words are pre-taught and the adult leads a discussion about the words. The comprehension activities consist mainly of added attention to questioning students after reading and drawing ELLs into discussion about the passage content.

Given the many elements of repeated reading interventions, and the variations in the format in different settings, it is hard to know exactly what

"active ingredient(s)" result in gains in fluency, and in turn, comprehension. It could be that there are particular components that are most powerful—such as the repeated oral reading itself—or perhaps a combination of multiple, less powerful, elements result in fluency, and in turn, comprehension gains. The elements of successful repeated reading, and the corresponding likely benefits for ELLs, include:

- ***Oral reading,*** which forces the reader to slow down and attend to each word and provides an opportunity to increase vocabulary knowledge and practice speaking and reading with appropriate expression;
- ***Corrective feedback from adults,*** which brings the student's attention to her miscue and provides the correct pronunciation;
- ***Discussions*** and ***questioning*** about the book, which is an opportunity to promote comprehension strategies and vocabulary development;
- Increased ***exposure to print*** which, for a variety of reasons, has been shown to have effects on students' overall reading ability; and
- The likelihood of increased ***engagement*** and ***motivation*** given the small group format and interaction with a supportive adult who structures and leads the intervention.

5. In all K-12 classrooms across the U.S., ELLs need significant opportunities to engage in structured, academic talk.

Language learning is not a passive process; it is facilitated through production and interaction, and therefore, depends heavily on the ability to practice and produce language, especially in academic settings[42]. A significant factor in developing sophisticated language skills is time on task producing academic language in interactive educational settings where there is opportunity for repeated exposure to and use of words, and opportunity for feedback. This is especially the case for ELLs. Although it is important for students to practice their language in informal settings, it is more important that there are structured opportunities in educational settings with supports in place.

There are many academic skills to be taught and learned in all classrooms in spite of limited time, and understandably the general focus within the system has been skills such as reading, writing, and mathematics. While the development of academic language is an important goal for all learners, it has not typically been an entity and educational goal of its own. This is especially the case for the oral aspects of academic language. Aside from the language

goals of many programs designed specifically for ELLs, there is generally minimal focus on providing structured opportunities for the practice and production of academic language in the context of grade-level content, as an important instructional goal in and of itself.

Providing structured opportunities to talk and discuss. In order to increase ELLs' academic language skills, and in turn their academic achievement, there are several principles and factors to consider[43]:

- Like most other academic skills, the development of oral language is a cumulative process and one that must be supported from kindergarten through twelfth grade.
- Although the primary means to developing language should be structured practice with language itself, this practice is further optimized when also connected to reading and writing activities.
- Reading aloud and shared readings that are accompanied by structured discussion are an excellent way to promote language development. Although reading aloud and shared reading are thought of as especially important in the primary grades and primarily thought of to promote comprehension skills, they are equally important in the middle and high school years when there is sophisticated language and content to be discussed. Reading aloud and shared readings provide an opportunity for practice and modeling effective language use, appropriate expression, and a platform for structured discussion, with scaffolds, to promote language development.
- Effective language practice and production needs to be supported by teachers, but not necessarily led by teachers. Ideally, teachers would plan for structured opportunities to practice language, model effective questioning and conversational practices, and gradually turn over the responsibility to students for peer-led discussions and conversations. A key variable in the language acquisition of ELLs is the amount of opportunity to practice language with peers who have slightly more developed language and/or are native English speakers[44].
- More structured "talk" in classrooms across the U.S. would provide increased opportunities to informally assess students' oral language development in different contexts and for students to monitor and become more aware of, and active in, their own language development.

6. Independent reading is only beneficial when it is structured and purposeful, and there is a good reader-text match.

With the goal of increasing students' encounters with language and print, and their background knowledge, independent reading takes place in many classrooms across the U.S. The typical scenario is that, for a prescribed amount of time, each student reads a book that he or she has selected from the class or school library, or one that the whole class is reading as part of novel study. There are many reasons why the opportunity to practice reading independently is potentially beneficial for all learners, but especially ELLs. Independent reading holds promise as a means for vocabulary development, increasing exposure to print, and improving fluency and comprehension.

However, independent reading is only beneficial to learners when it is very carefully planned and when several conditions are met. The most important of these conditions include: 1) the need for a careful match between the reader's ability and the characteristics of the text, and 2) explicit goals must be set for the independent reading activity, and there must be a link between the content of the reading activity and other aspects of the curriculum.

In many cases, especially in the case of ELLs, the text that the student selects, or is assigned, for independent reading is too difficult to promote her vocabulary and comprehension development. As a necessary, but not sufficient, condition to reap the benefits of independent reading, students must be able to decode and understand up to 90 percent of the text. If that is the case, then they stand a much greater chance of learning and working effectively with the remaining 10 percent of material. However, a ratio of unknown to known words that is too high (over 1:20) compromises the reader's ability to use independent reading as a way to acquire new knowledge and vocabulary. To infer the meaning of a word in context and to make meaning of a particular passage, the reader must be able to draw on his knowledge of the words around the unknown word, and in turn to draw on the meaning of the passage up to the point of the unknown material. When the percentage of unknown words is high, the reader has less and less opportunity to work with known information to infer word and text meaning.

The reader-text match is therefore a critical starting point for successful independent reading. However, there are other considerations that must also be taken into account. Independent reading—although the name suggests a stand-alone time to practice reading—must be incorporated into the curriculum and

be connected to other instructional activities, especially writing activities. Students must be reading for a purpose and, while reading, have an understanding that they will then work with this knowledge during follow-up activities such as a written reflection or a structured discussion with peers. Follow-up activities promote more student engagement with reading, increase awareness and monitoring of comprehension, and provide opportunities for repeated exposures to academic language in multiple contexts. The following is a list of considerations when planning for successful independent reading:

- Is there a match between the reader's ability and the text characteristics? Is the reader able to read the text with 90 percent accuracy?
- Is there a ratio of known to unknown words that supports vocabulary knowledge development during independent reading?
- Is there a relationship between the content of the book(s) for independent reading and the content and material being covered in the class?
- Is there a follow-up activity or discussion planned to be held after independent reading?
- Do the teacher and the student have a shared understanding of the purpose or goal that guides that particular session of independent reading?

Conclusions

Supporting and promoting the reading development of the growing population of ELLs is both a challenge and a necessity for educators across the nation. In this section, we identify six recommendations to guide the planning and implementation of any instructional approach or academic intervention to promote ELLs' reading ability:

1. ELLs need early, explicit, and intensive instruction in phonological awareness and phonics in order to build decoding skills.

2. K-12 classrooms across the nation must increase opportunities for ELLs to develop sophisticated vocabulary knowledge.

3. Reading instruction in K-12 classrooms must equip ELLs with strategies and knowledge to comprehend and analyze challenging narrative and expository texts.

4. Instruction and intervention to promote ELLs' reading fluency must focus on vocabulary and increased exposure to print.

5. In all K-12 classrooms across the U.S., ELLs need significant opportunities to engage in structured, academic talk.

6. Independent reading is only beneficial when it is structured and purposeful, and there is a good reader-text match.

These recommendations apply whether the instruction serves a *preventive*, *augmentative*, or *remedial* function, and whether the domain of focus is for class-wide instruction or small-group intensive intervention. These are decisions that must be made locally by the educators supporting ELLs on the basis of characteristics of the population being served combined with feasibility and appropriateness, given the instructional goal and/or target skills of focus.

This report was written to serve a guiding function, rather than as a "how-to" manual. As such, it is intended to serve as one starting point or reference for planning instruction and academic interventions for ELLs. Enabling the nation's ELLs to reach the highest standards of achievement demands sustained, consistent, and intensive delivery of high quality instruction and academic interventions that target the development of ELLs' academic language and reading-related skills, such as fluency, comprehension, and vocabulary. Success in this endeavor will be most assured when all educators who have an influence on this population's achievement participate in the planning and delivery of instruction and interventions.

Qualified Teachers for At-Risk Schools:

A National Imperative

An Inaugural Report From the

NATIONAL PARTNERSHIP for TEACHING in AT-RISK SCHOOLS

1825 Connecticut Avenue NW
Washington, DC 20009-5721
877-322-8700
NPTARS@learningpt.org

This work was originally produced in whole or in part with funds from the Education Commission of the States, ETS, and Learning Point Associates. The Joyce Foundation provided funding for the initial planning phase. The content does not necessarily reflect the position or policy of these organizations, nor does mention or visual representation of trade names or commercial products imply endorsement.

A National Imperative

Few challenges facing America today are as critical as improving the educational attainment of poor and minority children. The dimensions of the problem—and its enormous social and economic consequences—are evident in the following statistics:

- Black and Hispanic 12th graders perform at the same level in reading and mathematics as white 8th graders.[1]
- The high school graduation rate for Hispanics and blacks is roughly 55 percent, compared with 78 percent for white students.[2]
- By the age of 24, nearly half of young adults raised in affluent families have graduated from college, compared with only 7 percent of young adults raised in low-income families; while 34 percent of white adults obtain either a two-year or four-year college degree by age 25, only 20 percent of black adults and 15 percent of Hispanic adults receive a college degree by that age.[3]
- Eighty percent of inmates under the age of 25 in U.S. prisons lack a high school diploma, and 40 percent are functionally illiterate. Fifty percent of black high school dropouts have been incarcerated; in 2000, there were more black males in prison (791,600) than in college (603,000).[4]
- According to the 2000 Census, the median annual household income was $33,000 for Hispanics and $29,000 for blacks, compared with $47,000 for whites.[5]
- By 2020, there will be a shortage of workers qualified to fill the estimated 14 million white-collar jobs that will be vacated by baby boomers reaching retirement age.[6]

The recipe for reversing these disturbing trends is complex. It requires overcoming the disadvantages that so often plague the 26 million children who grow up in

low-income households: poor nutrition, substandard housing, inadequate health and dental care, physical danger from a culture of drugs and violence, family stress and insecurity, limited adult support, and few opportunities for cultural enrichment.

In addition to these disadvantages, poor children are typically handicapped by substandard and unequal educational opportunities. But of all the educational disparities poor children face, none is more significant than the disparity in the quality of their teachers.

William Sanders[7] and other researchers have shown the enormous difference that teachers can make in the achievement of their students. One study in Dallas in the mid-1990s, for example, showed that children assigned to effective teachers for three years in a row scored an average of 49 percentile points higher on a standardized reading assessment than children assigned to three ineffective teachers in a row.[8] By providing the same educational opportunities for poor children as for more affluent children—and, in particular, quality teachers—education can indeed become the "great equalizer" that enables all children to succeed.

Although there is much debate about what makes one teacher more effective than another, research findings point overwhelmingly to the importance of a teacher's mastery of his or her subject matter. Yet according to Richard Ingersoll,[9] there is a significant disparity in the content knowledge between teachers in high-poverty and more affluent schools. He found that when compared with teachers in more affluent schools, significantly more mathematics, science, English, and social studies teachers in high-poverty schools lack a major or a minor in their teaching field. In mathematics, for example, 43 percent of teachers in high-poverty schools lacked a major or minor in their field, compared with 27 percent in more affluent schools.

Not only do the teachers of low-income students tend to be more poorly trained in the subject they teach, they also are far more likely to have significantly less teaching experience. According to the National Center for Education Statistics,[10] 20 percent of teachers in high-poverty schools have three or fewer years of teaching experience, compared with 11 percent of teachers in low-poverty schools.

Even when the teachers in high-poverty schools have experience and credentials, they are generally inadequately prepared and supported to handle the enormous instructional challenges they face—challenges that would test the mettle of the most experienced and accomplished teachers. Experts from across the political spectrum increasingly have come to understand that a system in which teachers with the least experience are given the hardest teaching assignments is not serving the needs of students.

Efforts to improve the quality of teachers in high-poverty, low-performing schools have been largely uneven and unfocused. States or districts may tackle the general problem of teacher supply, for instance, and assume that increasing the number of teachers will benefit all schools, including those that are hardest to

staff. But our experience during the last five years in helping states examine and develop policies that address the issue of hard-to-staff schools suggests that the positive effects of such broad efforts rarely trickle down to the most vulnerable schools.

Further, individual schools and districts typically attempt to devise piecemeal solutions that have minimal, short-term impact. Developing policies and practices capable of adequately addressing staffing problems in at-risk schools requires sustained work on both the state and district levels. This, in turn, requires the ongoing commitment of key stakeholders, adequate resources, and a solid understanding of the issues and the strategies that can be used to address those issues.

The goal of this report is to provide some of that understanding: to discuss what we know and don't know about the challenge of staffing at-risk schools, and to identify some of the strategies that policymakers and other key stakeholders can consider in their efforts to ensure that students in all schools have the high-quality teachers they need and deserve.

The Elements of the Problem

What do we mean when we talk about "effective" or "well-qualified" teachers for "at-risk" schools? What factors contribute to the problem of staffing at-risk schools?

Defining the Terms

Effective and Well-Qualified Teachers. The National Partnership defines effective teachers as those who are able to consistently assist their students in making significant academic progress. To do this, teachers must have a command of their subject matter, understand how students learn, and have a broad repertoire of teaching methods to meet the diverse needs of students. Teachers should have, at a minimum, full certification in their main teaching field, though full certification does not ensure that a teacher will have the deep grasp of subject matter and the repertoire of instructional skills necessary to be effective with all students. And while teaching experience also does not guarantee effectiveness, research does indicate that teachers who have limited experience are generally less effective than teachers who have at least several years of teaching experience under their belts.

At-Risk Schools. A salient characteristic of at-risk schools is that they generally have relatively few well-qualified teachers. Overwhelmingly, the teachers in at-risk schools tend to have temporary or emergency certification, teach in fields for which they lack strong subject-matter preparation ("out-of-field"), or are in their first year or two of their teaching careers. Such schools generally have a difficult time attracting teachers with strong qualifications, especially in core subject areas, and often are unable to keep teachers for more than a few years. Similarly, these schools typically have difficulty attracting and retaining capable and experienced principals and other leaders.

At-risk schools are likely to serve a high proportion of minority and low-income students, have poor student achievement, and—if they are high schools—have lower graduation rates. Such schools often are found in core urban areas, but rural schools also may have many of these characteristics. Finally, while individual at-risk schools with these characteristics may beat the odds from time to time and may significantly exceed the average for student achievement among schools with their profile, we believe these schools are likely to fall back into a pattern of low achievement over time.

What Causes the Problem?

Many factors account for the problem of staffing at-risk schools, and not all schools face exactly the same challenges. Nevertheless, the large body of literature reviewed and synthesized by the National Partnership sheds considerable light on the causes of the problem.

Teacher Supply. Research at the state and national levels has shown that teacher shortages exist but vary by geographic area, subject area, and individual schools. A number of studies have confirmed that teacher shortages are most likely to be a problem in urban areas[12] and isolated or disadvantaged rural districts.[13] Shortages are most severe in the fields of mathematics and science[14] and special education.[15] And the shortages tend to be worse for schools serving high percentages of black and Hispanic students because teachers are more likely to transfer out of such schools.[16]

Teacher Distribution. The growing body of literature on teacher distribution suggests highly qualified teachers "self-select" into higher achieving schools. A particularly revealing study of New York teachers by Lankford, Loeb, and Wyckoff[17] found that teachers who transferred to another district or left teaching altogether tended to have better qualifications than their peers who remained.

Teacher Recruitment. Studies on the recruiting and hiring practices of school districts point to inefficiencies that deter qualified teachers from working in the most disadvantaged schools. A research study by Liu and Johnson,[18] based on surveys of a random sample of new teachers, found that teachers complained about the lack of information regarding potential placements and about late hiring. In California and Florida, for example, one third of teachers were hired after the school year already had begun. Also, a study by Levin and Quinn[19] focused on urban schools found that late hiring practices were directly responsible for some districts' inability to hire the teachers they needed. In fact, the districts in the study received five to seven times as many applications as they had positions to fill but failed to make job offers in a timely manner.

Support for Beginning Teachers. The literature related to beginning teacher support suggests that schools serving poor communities may not provide adequate support and resources for new and existing teachers. According to a study by Freeman, Brookhart, and Loadman,[20] for example, beginning teachers in schools serving large minority populations in high-poverty areas are more likely to feel that they are not able to develop good relationships with students whose backgrounds are significantly different from their own. These teachers also report a lower level of job satisfaction.

School Environment. Finally, the research literature on school environment reveals that high-poverty and high-minority schools are likely to be more dangerous, overcrowded, and poorly maintained; have higher rates of staff and student turnover and absenteeism; and suffer from an environment that is generally not as conducive to learning as that of other schools.[21] These schools are more likely to have weak leadership, yet research shows that an important element in teachers' decisions about teaching in particular schools is their confidence in the principal and other leaders.[22]

Taken together, these research findings reveal the depth of the national crisis we are facing in terms of staffing at-risk schools with well-qualified teachers. Better teachers self-select into higher achieving schools and leave their less qualified peers behind. Schools in urban districts and in isolated rural areas have a limited pool of qualified mathematics, science, and special education teachers from which to draw—a problem further exacerbated by inefficient recruiting and hiring practices. Even when qualified new teachers are hired, schools do not provide adequate support to help these teachers adjust, grow, and develop relationships with students who are often very different from themselves. And teachers in at-risk schools commonly find themselves in school environments that are often dangerous, overcrowded, and chaotic.

Moving Toward Solutions

A number of states and school districts as well as several foundations, advocacy and research organizations, universities and governmental agencies have established initiatives focused on the problem of staffing at-risk schools. It is our hope that some of the efforts currently under way will prove to be successful, provide solid models for others to emulate, and add significantly to our knowledge base.

State and School District Initiatives

In an effort to improve the preparation, recruitment, and retention of teachers, a number of states and school districts have implemented initiatives that touch on

various phases of the teacher career continuum—from preservice to initial licensure, to hiring and induction, to continued practice and professional development.

Teacher Preparation, Certification, and Licensure. A variety of state and institutional initiatives have been undertaken to improve the quality of instruction and practical classroom experience that traditional teacher-preparation programs provide. These initiatives include efforts to create changes in the allocation of resources, academic organization, faculty roles and evaluation, internal accountability, and relationships with practicing K–12 schools. Some states also are implementing performance-based certification and licensure policies, which establish standards for what teachers should know and be able to do at different stages of their teaching careers.

In addition, some school districts are working in partnership with local universities to provide alternative routes to certification. Because these programs provide shorter paths to becoming a teacher than the traditional route—and because many of them recruit significant percentages of individuals who differ from those in standard teacher-education programs (i.e., candidates who are older, minority, male, or have experience working in urban settings)—school districts in urban and rural areas where shortages are more prevalent view these programs as a solution to filling teaching vacancies more quickly and with candidates who may better meet the needs of their students.

It is important to note, however, that despite the fact that alternative-route programs can reduce the incidence of teachers teaching outside of their content expertise, alternative programs that provide little pedagogical preparation for new teachers prior to their entry into the classroom still shortchange those teachers and their students. Moreover, to regard alternatively prepared teachers as a panacea for the staffing problems in at-risk schools is to continue to put students in those schools at a disadvantage in comparison with their peers

■ Carnegie Corporation of New York is funding the Teachers for a New Era initiative in several universities across the nation. Selected universities, such as Bank Street College in New York City, were awarded a five-year grant to prepare more effective and accountable teachers for urban schools, which are most often characterized as hard to staff.

■ The No Child Left Behind Act's Transition to Teaching program authorizes competitive five-year grants to partnerships and eligible entities to establish programs to recruit and retain highly qualified midcareer professionals and recent college graduates as teachers in high-need schools. This program includes recruiting teachers through alternative routes to certification under state-approved programs that enable individuals to be eligible for teacher certification within a reduced period of time.

in schools where there is a more stable and experienced faculty.

Teacher Recruitment. To address the recruitment challenges in at-risk schools, states have been implementing initiatives to tap into already existing and potential pools of teachers. For example, because inefficiencies in many districts' technological infrastructures are exacerbating the hiring process for teacher candidates (by having to submit multiple, sometimes hand-written, applications for a single district), states and school districts are developing Web-based application systems that make it easier for teaching candidates to submit their applications in a more timely and efficient manner.

In Chattanooga, Tennessee, the mayor's Community Education Alliance, in partnership with Chattanooga Neighborhood Enterprises Inc. and two local foundations, supports an incentive program to draw high-performing teachers to nine struggling inner-city schools. Teachers who transfer to the identified schools earn an extra $5,000 a year. In addition, the program offers up to $10,000 in equity to highly qualified teachers in the program and a low-interest second mortgage to all teachers who teach in one of the designated schools. The success of this initiative is demonstrated in the improved test scores of students in the nine schools. Based on data from the TerraNova achievement tests in 2002, the Public Education Foundation reported increases in reading and mathematics. And as of 2004, the nine schools were showing higher academic gains on state tests than the top 10 percent of elementary schools. For more information, refer to the City of Chattanooga press release (www.chattanooga.gov/mayor/Press_Releases/CEA%20announces%20results%20504.htm).

"Grow-your-own" programs also are being implemented to improve recruitment and retention for hard-to-staff schools, especially in subject areas and in rural and urban districts where data show that at the current rate, teacher shortages are inevitable. Some of these programs begin exposing students to teaching as a profession as early as the seventh grade, while others work with college students or instructional aides.

Increasingly common at both the state and district levels are a variety of financial incentives—such as higher salaries and signing bonuses—to attract and retain qualified teachers in at-risk schools. But such incentives do not appear to be effective in providing long-term solutions to the staffing difficulties in at-risk schools. Also, increasing salaries for a large number of teachers significantly beyond the inflation-adjusted average would almost certainly require a commitment of federal, state, and district funding far above current levels.

As the percentage of minority students in public schools increases and now stands at 40 percent, the percentage of minority teachers in the profession remains at only 10 percent.[23] Because minority teachers may have special insights into students who are like themselves, may be able more easily to establish trusting relationships with minority students, and can serve as important role models, there has been an increasing push to increase minority representation in the teaching profession.[24] A number of states and districts have undertaken special minority teacher recruitment efforts that include strategies similar to the ones previously mentioned. In addition, there is a stepped-up effort to recruit community college students into teaching because minorities constitute a significant percentage of the community college population.

Support for Beginning Teachers. The importance of providing adequate support and guidance to beginning teachers resonates throughout the statistics on new-teacher attrition, particularly in at-risk schools where the rate of teacher attrition is significantly higher than in more affluent schools. A recent study of schools in Colorado, for example, revealed that statewide, 20 percent of teachers left their schools each year from 2001 to 2004, but 10 at-risk schools in the Denver district had annual turnover rates of 50 percent or higher from 2002 to 2003.[25]

Because research supports the success of comprehensive induction programs—even when other factors such as salary, school conditions, and personal background of the teacher are taken into account—more and more states and districts are implementing such programs for new teachers. A comprehensive induction program includes a combination of mentoring, professional development and support, and formal assessments for new teachers during at least their first two years of teaching.[26] Such programs, while expensive, have proven to be highly effective in keeping quality teachers in the profession, identifying teachers who perform poorly, providing clinical training, building a strong community of teacher learners, and orienting teachers to their local schools.

At least 15 states currently require and fund comprehensive induction programs, including the Teacher Retention Initiative in the state of Virginia, which will fund mentoring programs for new teachers in hard-to-staff schools during their first year in the classroom.

Other initiatives for improving new teacher support include the Cleveland Initiative for Education, which seeks to improve teacher quality and develop policy recommendations for improving teacher induction and retention in Cleveland, Ohio.

Teacher Retention. In addition to the mentoring and induction support offered to beginning teachers, states and districts have developed a variety of strategies to increase the satisfaction, effectiveness, and retention of veteran teachers. One increasingly common strategy is targeted compensation policies that reward teachers not for years of experience but for demonstration of quality. Such evidence can include certification by the National Board for Professional Teaching Standards or

significant achievement gains by a teacher's students. These performance-based measures often have the additional benefit of motivating teachers to immerse themselves in professional development, pursue career advancement opportunities within education, and regard teaching as a more long-term profession.

School Environment. States and districts are beginning to address the important role of the school environment in teacher retention and effectiveness, which is especially important for at-risk schools. Some states have undertaken, or plan to undertake, surveys of their entire teacher workforce to identify the factors that are most distressing for teachers about their work environment. Other states and districts regularly administer school satisfaction surveys that solicit the views of students, teachers, and parents about the climate in their schools and suggestions for improving it. Efforts to reduce the size of comprehensive high schools in order to strengthen the sense of community and connection and thereby increase support for learning are widespread throughout the country. And, increasingly, when the climate in particular schools has led to unacceptable performance, states and districts are restructuring or "reconstituting" schools from the bottom up.

School Leadership. Recognizing that school leadership plays a critical role in establishing a productive school climate, states increasingly are paying attention to the importance of developing and supporting strong school leaders at the building and district levels. Education policy reforms, reinforced by NCLB requirements, have placed new emphasis on the role of the school principal as instructional leader.

Yet the quality of principals in hard-to-staff schools is reportedly low. A 2001 Public Agenda report[27] found that 29 percent of superintendents believed the quality of principals had declined measurably in recent years. In addition, the number of principal openings is expected to grow as the number of retirements continues to increase. This situation will pose the greatest challenges to urban and rural districts with large concentrations of hard-to-staff schools that

The University of Virginia Partnership for Leaders in Education has been contracted to deliver an executive education program specially designed for the needs of a cadre of experts charged with turning around consistently low-performing and hard-to-staff schools in the state. The program focuses on leadership challenges, strategic change, decision making, communications, and partnering. It offers the opportunity for successful school administrators who have already earned at least a master's degree to also earn a professional credential in educational turnaround management. Additional information about the Virginia School Turnaround Specialist Program is available online (www.darden.virginia.edu/VDOE/).

experience the highest principal turnover rates, often due to lower principal salaries and high numbers of inexperienced principals.

States and local school districts have started to address these leadership issues through initiatives to improve principal preparation, licensure, and professional development. Also, schools are beginning to think of leadership not only in terms of principals but also other school administrators and teachers. The idea of distributed leadership—that is, sharing leadership across various staff levels from teachers to school administrators within a school—is beginning to receive more attention. Although the idea has been around for some time, very little is known about how successful this approach to leadership is in practice.

Through a grant from Washington Mutual, the Education Commission of the States and Learning Point Associates are working in Illinois and Texas to design a blueprint for the use of time for professional development in in hard-to-staff schools. The goal is to provide more opportunities for teacher support and development that will stem teacher attrition and make it easier to recruit new teachers into hard-to-staff schools in the districts. For more details, refer to "Teacher Quality: Use of Time in Hard-to-Staff Schools" (www.ecs.org/html/ProjectbySubject.asp?issueID=129).

Efforts of the National Partners

The three partner organizations in the National Partnership for Teaching in At-Risk Schools have each accomplished, or are currently engaged in, significant work on the issue of hard-to-staff schools.

The Education Commission of the States (ECS) launched its Quality Teachers for At-Risk Schools initiative in early 2003. The goal of the effort, which was initiated by Virginia Governor Mark Warner, is to deepen state leaders' understanding of policy issues that are crucial to improving the supply, distribution, and quality of teachers in hard-to-staff urban and rural schools.

Prior to this effort, ECS spent four years on a project funded by the Wallace Foundation that involved work on the issue of hard-to-staff schools in 17 states. The project convened statewide policymaker and stakeholder meetings, motivated important policy changes, produced several publications on teacher quality, and enabled ECS to develop a comprehensive approach to helping states assess and respond to the teaching crisis in their most at-risk schools. One of the valuable lessons that ECS learned from this work is that efforts to improve the quality of teaching in hard-to-staff schools must specifically target those schools and not the state teacher shortage or quality problem as a whole.