Re-conceptualizing Extra Help for High School Students in a High Standards Era

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Introduction

One of the aims of the standards and accountability movement is to make intellectually demanding course work in high school the norm (Achieve, 2001; Committee for Economic Development, 2000). Significant progress has been made towards this goal. In 1980, for example, it was possible to graduate from high school in many school districts with only one credit in mathematics. Today three and in some cases four credits are needed, and increasingly all students are, at a minimum, being required to take algebra and geometry (Blank & Langesen, 1999; Christie, 2001). There is compelling evidence that challenging coursework in high school leads to higher levels of academic achievement, success in college, and through this a greater range of opportunities in life (Alexander & Pallas 1984; Hoffer, Rasinski, & Moore, 1995; Meyer, 1999; Girotto & Peterson, 1999; Adelman, 1999). These positive impacts also appear to exist for students at all levels of the achievement spectrum (Gamoran & Hannigan, 2000). Thus, it is anticipated that ensuring all students, regardless of background or income level, receive access to high quality instruction and rigorous coursework in high school will reap substantial social and economic benefits at both the individual and national levels (Betts, 1998; Bishop & Mane, 2001).

Expecting all students to engage in and succeed with challenging work in high school, however, places on high schools demands they have not been historically organized to face. One of these demands is providing students who enter high school without the prior preparation, skills, and strategies needed to succeed in a standards-based sequence of college prep courses with the extra help and support they need to accelerate their learning and catch-up. Traditionally, high schools have accommodated different levels of prior preparation and achievement by creating tiers of course offerings. Only students in the highest tracks were expected to master challenging material (Powell, Farrar, & Cohen, 1985; Lucas, 1999). Consequently, extra help became conceptualized primarily as tutoring for students who where in danger of failing a specific course or wanted to improve their grade.

The notion that large numbers of students, at least in some high schools, might be in need of organized and sustained extra help and support to develop the reading and mathematical skills assumed by challenging high school level work is not part of the mission, organizational structure, or culture of high schools. High school English teachers, for example, do not see themselves as reading teachers. To the extent that remediation is offered, it typically focuses on either providing small subsets of students with instruction in elementary basic skills or somewhat large groups with instruction narrowly focused to the requirements of mandated tests. Few high schools see it as their mission to provide many students with extra help designed to enable them to make a successful transition from elementary to high school level work. As a result, high schools are not typically equipped to strengthen their students' intermediate level skills and develop the more advanced reading comprehension and mathematical reasoning strategies assumed by standards-based courses.

As the push for higher standards becomes institutionalized through raised promotion and graduation requirements, providing extra-help to high school students moves from a need to a necessity (Jacob, 2001). In a growing number of districts, for example, passing algebra is becoming a requirement for promotion into the tenth grade. In some locales, this promotion decision is based in part on challenging district-wide end-of-course exams (School District of Philadelphia, 2000). This may potentially bring significant individual and national benefits. Having all students take and succeed in algebra in the ninth grade places everyone on equal footing to reap the benefits of advanced mathematics courses in high school. Completing a mathematics course beyond Algebra II in the Algebra-Geometry-Algebra II-Trig/Pre-Calculus high school course sequence has been found to have a significant impact on college completion and at many colleges and universities students need to have completed the sequence at least through Algebra II to avoid remediation (Adelman, 1999). This has lead Robert Moses (2001), among others, to view algebra for all students as a civil right.

All of these benefits, however, will be mitigated if requiring the passing of algebra in

ninth grade or other efforts to raise standards leads to an increase in the dropout rate or makes the existing rate less likely to decline. This is because the negative social and economic impacts of a significant high school drop out rate may be greater than the positive benefits of increasing the rigor of high school work (Betts, 1998; Mayer & Peterson, 1999; Levin, 2001, Coalition for Juvenile Justice 2001). In high poverty urban high schools, non-promotion to the 10th grade greatly enhances the odds that a student will drop out (Neild & Balfanz, 2001; Neild, Stoner-Eby & Furstenberg, 2001; Roderick & Engles, 1999). Thus without substantial extra help, students who enter ninth grade multiple grade levels behind will face a high-risk proposition. Either they will find the wherewithal to overcome their poor prior preparation, succeed in algebra, and be launched towards a promising future, or they will fail algebra, be retained in ninth grade, and be placed on a trajectory towards dropping out. Thus, there is clearly a great need to develop and provide high poverty high schools with effective means of providing their students with the extra help and support they need to take and pass challenging courses in the early grades of high school.

The extra help demands faced by high schools with high standards for all students, however, are not limited to entry-level courses and the inner city. The fact that by some estimates up to a quarter of entering college students need to take remedial math or reading classes (A closer look at remediation, 1996), and that a number of states have had to scale back or delay their proposed graduation exams because of high initial failure rates indicates that a large gulf exists between current and desired levels of high school achievement nationwide (Jacob, 2001; Olson, 2001).

Accordingly, there is a strong imperative to understand the extent and type of extra help high school students will need to thrive in a high standards environment and to examine the current state of knowledge about the provision of effective extra help. This is especially the case for mathematics and reading courses that serve as foundational skills for other content areas. The first section of this paper analyzes the scale and scope of the need for extra help in reading and mathematics among high school students. The second section examines existing efforts to provide extra help in reading and mathematics and argues that while the development of systematic and effective extra help for high school students is in its infancy, we are beginning to learn something about its critical components. The third section explores the policy implications and challenges inherent in any effort to provide high school students with substantial extra help. The final section discusses the federal role.

Identifying the Extra Help High School Students Need

Determining how many high school students need extra help in reading and mathematics is not a simple matter. It depends upon how the expected level of performance for entering high school students is established. One traditional approach is to provide extra assistance for students who score two or more years behind grade level norms on standardized tests. On the CTBS-5 Terra Nova, a test commonly used as part of state assessment systems, an entering ninth grade student performing at the seventh grade level would fall at the 32nd percentile in reading and the 23rd percentile in mathematics. Thus by this measure roughly a third of entering ninth grade students need extra help in reading and a quarter in mathematics. Betts (1998) finds similar results in his analysis of the math test score data from the Longitudinal Study of American Youth where he calculates that 31% of ninth graders score below the median achievement of students in the seventh grade. Standardized tests, however, have been criticized for measuring students against the existing level of performance among their peers rather than performance levels benchmarked against desired national standards or existing levels of international achievement. Both the National Assessment of Educational Progress (NAEP) and the Third International Mathematics and Science Study (TIMSS) have attempted to develop performance levels that show the types of skills students have at different achievement levels and the percent of students who possess these skills. Comparing current levels of eighth grade achievement against these measures leads to significant increases in the estimated number of entering high school students in need of extra help.

In a recent TIMSS benchmarking study, for example, 61% of US 13-year-olds reached the international median of mathematics achievement, the midpoint of performance for all students from the 38 countries who took part in the study (Mullis et al., 2001). Students who reached this level could:

… Apply basic mathematical knowledge in straightforward situations. They can add or subtract to solve one-step

> word problems involving whole numbers and decimals; identify representations of common fractions and relative sizes of fractions; solve for missing terms in proportions; recognize basic notions of percent and probability; use basic properties of geometric figures; read and interpret graphs, tables, and understand simple algebraic relationships. (p. 79)

Thus if the goal is to have every US student perform at least as well as the average student worldwide, roughly two out of five entering high school students might need extra help in mathematics.

The NAEP long-term study of trends in student performance (Campbell, Hombo, & Mazzeo, 2000) defines *Moderately Complex Procedures and Reasoning* as follows:

> Students at this level are developing an understanding of number systems. They can compute with decimals, simple fractions, and commonly encountered percents. They can identify geometric figures, measure lengths and angles, and calculate the area of rectangles. These students are also able to interpret simple inequalities, evaluate formulas, and solve simple linear equations. They can find averages, make decisions based on information drawn from graphs, and use logical reasoning to solve problems. They are developing the skills to operate with signed numbers, exponents, and square roots. (p. 18)

This level of mathematical understanding is called for in many state middle school standards and is consistent with the NCTM standards for grades six to eight (National Council of Teachers of Mathematics, 2000). According to the most recent NAEP data, however, the moderately complex procedures and reasoning level of achievement is reached by only 23% of 13-year-olds (up from 18% in 1978). These data suggest that until improvements are made in middle schools, the majority of entering ninth graders may need extra help or organized learning opportunities to develop many of the intermediate level skills assumed by the college prep mathematics course sequence.

There is less consensus about what constitutes a reasonable level of reading ability for an entering high school student. At a minimum, however, what the NAEP long-term study (Campbell, Hombo, & Mazzeo) defines as the ability to —*Interrelate Ideas and Make Generalizations*— seems appropriate. At this level, readers

> ...use intermediate skills and strategies to search for, locate, and organize the information they find in relatively lengthy passages and can recognize paraphrases of what they have read. They can also make inferences and reach generalizations about main ideas and author's purpose from passages dealing with literature, science and social studies. Performance at this level suggests the ability to search for specific information, interrelated ideas and make generalizations. (p.17)

This level of reading ability is reached by 61% of 13-year-olds. It could be argued, however, that in a standards based era where high school students are expected to pass challenging end-of-course tests beginning in the ninth grade that the NAEP 300 level defined as —*Understand Complicated Information*— more nearly approximates the requisite level of reading skills needed by freshmen.

Readers at this level can understand complicated literary and informational passages, including material about topics they study at school. They can also analyze and integrate less familiar material about topics they study at school as well as provide reactions to and explanations of the text as a whole. Performance at this level suggests the ability to find, understand, summarize, and explain relatively complicated information. (p.17)

According to the NAEP data, however, this level of reading ability is only obtained by 15% of 13-year-olds (up from 10% in 1971).

Thus, the number of entering high school students in need of extra help depends on the standard applied. The most conservative measure, which asks what percent of students are two or more years behind the average level of reading and mathematics achievement currently found among ninth graders, indicates that between a quarter to a third of ninth graders need extra help. If national or international benchmarks are employed, however, it becomes clear that during the transition to a high standards era, the majority of entering high school students may need extra help or accelerated learning opportunities to acquire the intermediate skills and reasoning strategies that provide the foundations for success in high school courses.

Some have argued that current levels of performance on the NAEP and TIMSS exams may reflect the lack of incentives for hard work in US schools and/or the low stakes nature of these exams (Bishop & Mane, 2001; Madaus & Clarke, 2001). To the extent that this is true, it suggests that the NAEP and TIMSS data reflect motivation problems, as well as skill and strategy gaps. Two factors, however,

argue against the notion that much of the need for extra-help detailed above will dissipate if incentives for hard work are increased. First, student motivation among low achieving students is a complex phenomenon that is far from fully understood (Roderick & Engel, 2001). Second, detailed analysis of the TIMSS results shows that cross-national differences in student achievement are strongly influenced by differences in curriculum and instruction (Schmidt, McKnight, Cogan, Jakwerth & Houang, 1999).

The Need for Extra Help is Most Pervasive in High Poverty High Schools

In many ways, national figures on the need for extra help are incomplete policy guides. They blur the fact that the number of students needing extra help varies greatly across states, schools districts, and across different types of high schools (selective, magnet, and neighborhood) within districts. At the state level, for instance, it is estimated that 69% of eighth grade students in Minnesota would perform above the median level on the TIMSS test (a level of performance only surpassed by Singapore), compared to 37% of the students in Mississippi (Johnson, Siegendorf, & Phillips, 1998). Although sufficient disaggregated data to perform a detailed analysis of the need for extra help across school districts do not exist, several trends can be discerned. In almost every state, there is at least a 35-percentage point difference between the percent of white eighth graders and the percent of eighth graders in the state's largest minority group scoring at the basic level in mathematics on the NAEP test (Blank and Langesen, 1999). The state of Minnesota as a whole compares favorably to the highest performing nations on the TIMSS exam but it has a 46 percentage point gap between white and black eighth graders scoring at or above basic on the NAEP exam. Secondly, the differences in achievement levels obtained by students in the high and low poverty districts who participated in the 1999 TIMSS repeat study are striking. Naperville, Illinois, the district with the lowest poverty rate in the study—where less than 5% of the students qualify for free lunch—consistently ranked alongside the top performing countries in the world. Miami-Dade in Florida, the district with the highest poverty rate in the sample-where 70% of the students qualify for free lunch- consistently ranked alongside the lowest performing countries. Ninety-one percent of the students in Naperville performed at the median international level compared to only 29% of the students in Miami-Dade (Mullis et al., 2001). This suggests that fewer than 10% of the students in a the low poverty district may need extra help compared to 70% of the students in a high poverty district. Thus, to the extent that a state has a high degree of residential segregation and concentrated poverty, there could be wide differences between districts regarding the percentage of high school students needing extra help.

These two trends come together in nonselective, high poverty, central city high schools (Balfanz & Legters, 2001). In many of these schools, literally every student needs extra help (Neild & Balfanz, 2001). Figure 1 shows the distribution of reading and mathematics levels for first-time freshmen attending nonselective neighborhood schools in Philadelphia (as measured by the Stanford–9 Achievement test). It indicates that about half the students who attend a nonselective high school in Philadelphia begin their freshmen year of high school three or more years behind grade level in mathematics and reading achievement. Figure 2 shows that in eight of the twenty-two high schools less than 30 percent of entering freshmen are within two years of the expected grade level in both mathematics and reading.

This level of need is not unique to Philadelphia- it can be found in most large cities with high poverty rates that have developed a two-tier system of selective and nonselective high schools. In our work helping schools implement the Talent Development High School model across the country, for instance, we have consistently found that the typical student entering a nonselective, high poverty high school in cities like Baltimore, Newark, New Orleans, and St. Louis scores between the fifth and sixth grade levels in mathematics and reading.

Most High School Students in Need of Extra Help do not Need Traditional Remedial Instruction in Basic Elementary Skills

Traditional remediation often assumes that students need to be retaught basic elementary-level skills. Consequently, high school remedial classes often begin by instructing reading students how to decode and mathematics students how to perform whole number operations (Barry, 1997). Existing data indicate that this is not the type and level of extra help that most entering high school students need. NAEP data, for instance, indicates that 93% of 13-year-olds can "locate and identify facts from simple informational paragraphs, stories, and new articles. In addition they can combine ideas and make inferences based on short,

Figure 1

Eighth grade reading comprehension and mathematics grade equivalents: First-time freshmen in non-selective Philadelphia high schools, 1999-00

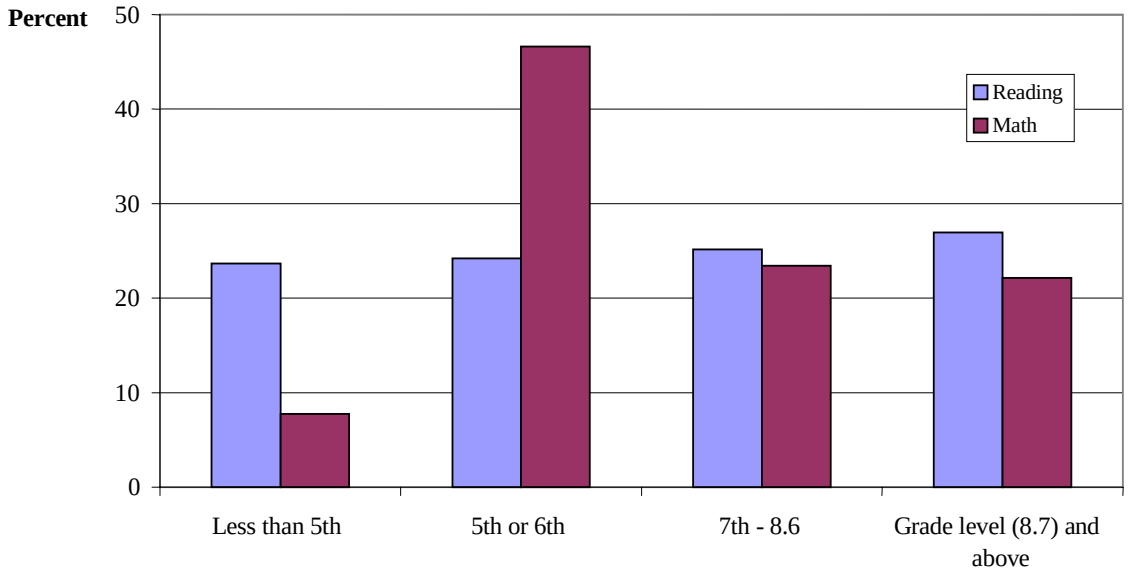
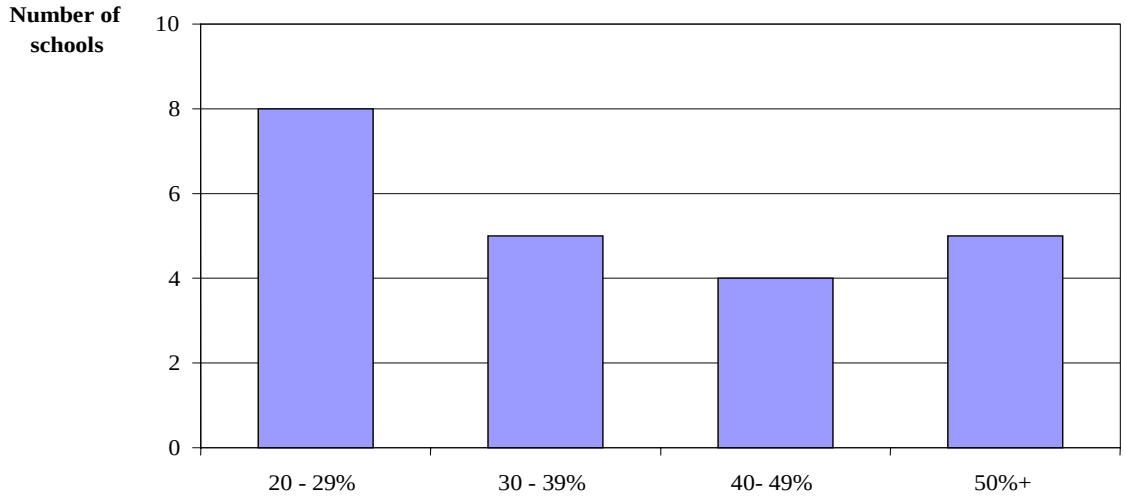


Figure 2

Concentration of first-time freshmen at Philadelphia neighborhood high schools with with reading and math skills at or above the 7th grade level



uncomplicated passages" (Campbell, Hombo, & Mazzeo 2000, p.17). Similarly, 99% of 13-year-olds "have initial understanding of the four basic operations" in mathematics and "can read information from charts and graphs, and use simple measurement instruments." (p. 18). This is further confirmed by the TIMSS data, which show between two-thirds and four-fifths of the eighth grade students from the four high poverty school districts

Figure 3

Fractions and Number Sense
There are 68 rows of cars in a parking lot. Each row has 92 cars. Which of these would give the closes estimate of the total number of cars in the parking lot?

A. 60 x 90 = 5400

B. 60 x 100 = 6000

C. 70 x 90 = 6300

D. 70 x 100 = 7000

(Chicago, Jersey City, Rochester, NY, and Miami-Dade) participating in the 1999 Repeat study successfully solved the items involving whole number computation, estimation, and interpreting data in tables. On all of these items students in high poverty districts performed at or above the international median. For example, 84% of the eighth graders in Chicago, solved the estimation and multiplication problem in Figure 3 (Mullis et al., 2001). This equals the performance of students in Japan and Montgomery County, MD, an affluent community with a highly regarded school system. It is also significantly higher than the international average of 65%.

Finally, the fact that the typical entering ninth grade student in the nonselective high poverty high schools the Talent Development High School model has been working with score around the fifth or sixth grade level on standardized tests adds additional support to the notion that the large majority of entering high school students in need of extra help in mathematics and reading already have a foundation of elementary skills and knowledge upon which to build. In each of the eight, large, high poverty neighborhood high schools in Baltimore, for example, there are between 20 to 80 ninth-graders that have repeatedly failed the Maryland functional reading test which is set at a fifth grade level. These students may lack elementary level decoding and word attack skills and are likely in need of intensive instruction. There are, however, hundreds of ninth graders in each of the eight neighborhood high schools who have passed the functional reading test and but still read at the fifth or sixth grade level and need organized and sustained extra help to become high school-level readers.

What the Majority of Students Need is Extra Help to Develop Intermediate Level Skills and Advanced Reasoning Strategies

The specific types of skills and strategies most high school students in need of extra help lack vary by domain but share several features: they involve intermediate level skills (abilities that are the focus of a good middle school education) and more advanced reasoning strategies.

Reading Skills and Strategies

The typical high school student who is a struggling reader does not have the fluency to simultaneously move smoothly through a complex passage with more advanced vocabulary and apply comprehension strategies to mentally interact with the author's work and accurately derive the intended meaning (Schoenbach, Greenleaf, Cziko, & Hurwitz, 1999). Weaknesses of the thinking and reasoning competencies used by mature readers can be found with many entering high school students, but are compounded by fluency deficiencies of the struggling readers from high-poverty backgrounds or poor reading instruction and practice in the early grades (Kamil, Mosenthahl, Pearson, & Barr, 2000).

When high school students fail to interact with reading materials, they do not engage in a number of comprehension strategies that a mature reader will naturally employ at while progressing through a work of literature or nonfiction. These strategies include relating the reading to one's own prior knowledge and experiences, skimming the captions and subtitles of a nonfiction selection to notice major topics and themes being covered, figuring out the meaning of unknown words or phrases by making guesses from the context of the passage or going back to reread for clarification or correction, predicting next developments in a story, recognizing devices used by au-

Figure 4

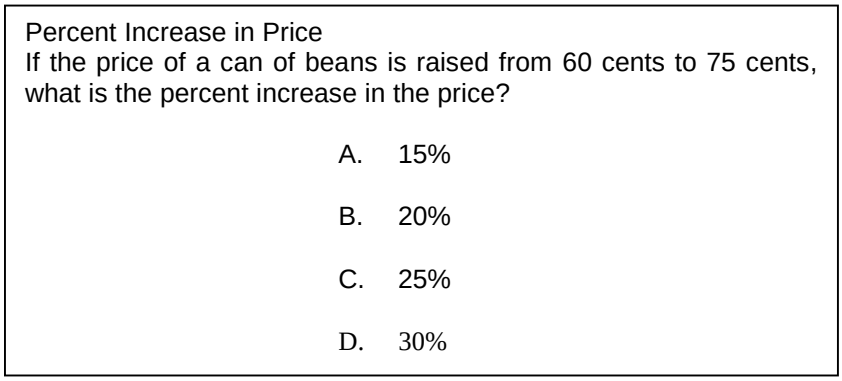


Table 1

Difference Between Beginning and Expert Readers

Beginning Readers	Expert Readers
• See all text as the same, Skip headlines, captions summaries, and so on.	• Read headlines, captions, summaries and so on. Notice organization of text (sections, chapters.)
• See all information as new or related to "common sense." Read passively and expect to "learn" from text without thinking about it.	• Relate new reading knowledge to prior knowledge. Create mental models of text (or diagrams, outlines if needed.)
• Read to "get through."	• Read for understanding.
• Have few reading strategies and guess about which to use.	• Have many reading strategies and know when to use them.
• Need to consciously, slowly, effort effortfully make sense of what they read.	• Can make sense of most texts without having to consciously think it through.
• Are not aware of whether they understand or not.	• Know when they are understanding or not.

thors to develop characters or plot, appreciating the writer's craft in the use of symbolism, irony or other literary forms, and generally having a mental conversation with the author that reflects on the meaning of the selection to oneself as a reader (Harvey & Goudvis, 2000).

The inability to read grade-level texts fluently, decipher their vocabulary, and apply comprehension strategies leads to great frustration among struggling readers and the conclusion that they can not read well or that reading is not for them. As a result, struggling readers often stop trying, don't read for enjoyment, and as a result fail to gain any further experience or practice with reading (Stewart, Paradis, Ross, & Lewis 1996). Thus, another clear need for many high school students who do not read well is that they need to be reengaged with the joys and benefits of reading.

Overall, then the majority of high school students in need of extra help with reading need support and direction to make the transition from being a beginning reader to becoming an expert reader. Cromley (2000, p.132) highlights the critical difference between these two stages in Table 1.

Mathematics Skills and Strategies

Little systematic research has been conducted on the types of mathematical skills and strategies students who enter high school behind grade level lack. It is possible, however, to glean some insight from existing sources that suggest three areas of need. A recent synthesis of existing research on mathematical learning by the National Research Council (NRC), as well as interviews with high school teachers indicate that operating with rational numbers (fractions, decimals, and percents) and integers (positive and negative numbers) are the two intermediate skill areas where entering high school students are most in need of extra-help (Kilpatrick, Swafford, & Findell 2001). These two domains are conceptually challenging, procedurally complex, and vital to success in standards-based high school math. They cannot be mastered by simply extending one's knowledge of whole number operations, and are made more challenging by the fact that implicit rules learned for operating with whole, positive numbers do not apply (Stavy & Tirosh 2000). For ex-

ample, when two positive whole numbers (other than zero) are multiplied, the result is a number greater then the two numbers being multiplied. . When students begin to learn how to operate with rational numbers and integers they need to adjust their implicit understanding of multiplication since the opposite occurs when you multiply two fractions or a negative and positive number together (a lesser number is the result). Consequently, rational numbers and integers take time, experience, and well-organized instruction to comprehend and master (Kilpatrick, Swafford & Findell, 2001). Traditionally, operations with rational numbers, and, to a lesser extent, integers, are the primary focus of instruction in upper elementary and middle school grades. However, both the TIMSS study and research conducted in high poverty middle schools indicates that not all middle school students receive sufficient and effective instruction in these topics (Balfanz, 1997; Mullis et al., 2001; Cogan, Schmidt, and Wiley, 2001).

A second area in which many students may need extra help is with the transition from arithmetic to mathematics. One of the central TIMSS findings is that the US curriculum is highly repetitive and remains strongly focused on arithmetic between the fourth and eighth grades. Consequently, students in the US are taught fewer advanced mathematical topics in seventh and eighth grade than are students in higher achieving nations (Schmidt et al., 1999). As a result, the learning curve in high school mathematics can be very steep. A perusal of the leading algebra textbooks used in the ninth grade, for example, indicates that many of the texts begin with a rapid "review" of probability, proportional reasoning, measurement, data, and geometry topics that large numbers of students, according to TIMSS data, have had limited opportunity to learn in middle school. This in part might explain the 50% failure rates in first-year algebra encountered by reform efforts in urban, high-poverty high schools (Ham & Walker, 1999).

Mathematical reasoning is the final area in which many students are in need of extra help. Consider the problem from the TIMSS study presented in Figure 4. The conceptual and procedural knowledge needed to solve this problem is not extraordinary. The problem can be solved quickly and without recourse to even pencil and paper if you recognize that a) you need to determine what percent 15 is of 60 and that b) this can be found in several ways, including recognizing that 15 is one-quarter of 60 and that one-quarter is the same as 25%.

Yet, only 20% of US eighth graders and between 40 and 50% of students in many of the highest performing countries solved this problem correctly. This is not an isolated result. The recent National Research Council (NRC) synthesis of research on mathematical learning (Kilpatrick, Swafford, & Findell, 2001) states, "On the 23 problem-solving tasks given as part of the 1996 NAEP in which students had to construct an extended response, the incidence of satisfactory or better response was less than 10% on about half of the tasks" (p.138). The NRC study further finds that performance "on word problems declines dramatically when additional features are included, such as more than one step or extraneous information" and that eighth graders experience much difficulty with problems that ask them to "justify and explain their solutions." The NRC study also provides its own vivid example of how challenging mathematical reasoning can be for many adolescents:

> "Another example is a multiple-choice problem in which students were asked to estimate 12/13 + 7/8. The choices were 1, 2, 19, and 21. Fifty-five percent of the 13-year-olds chose either 19 or 21 as the correct response. Even modest levels of reasoning should have prevented these errors. Simply observing that 12/13 and 7/8 are numbers less than one and that the sum of two numbers less than one is less than two would have made it apparent that 19 and 21 were unreasonable answers. This level of performance is especially striking because this kind of reasoning does not require procedural fluency *plus* additional proficiency. In many ways, it is less demanding than the computational task and requires only that basic understanding and reasoning be connected. It is clear that for many students that connection is not being made" (p. 139).

Last, in an analysis of state level differences in eighth grade performance on NAEP, Raudenbush, Fotiu, and Cheong (1998) found that a) teacher reported emphasis on reasoning was a strong predictor of math proficiency and b) there exists substantial variation across states and among subgroups in access to eighth grade teachers who encouraged mathematical reasoning in their classrooms. All of this, in turn, indicates that significant numbers of students enter high school without the mathematical reasoning skills that are assumed by the college prep strand of high school mathematics courses and a

growing number of high stakes tests being given as early as the ninth grade.

In an Era of Rising Standards and Accountability, there is a Need to Re-Conceptualize Extra Help for High School Students

Traditionally extra help for high school students has been viewed in one of three ways: life-adjustment math and functional reading for students deemed to have limited futures, remedial instruction in elementary skills; or tutoring for students struggling to pass a course, trying to improve their grade, or preparing for SAT's or ACT's. What we have attempted to show in the first half of this paper is that in a time in which the goal is to "Leave No Child Behind" and require all high school students to demonstrate a strong knowledge base and the use of sophisticated strategies, the need for organized extra help in mathematics and reading is substantial, multifaceted, and quite different from how it has been historically conceived.

A continuum of extra-help needs exist for high school students. The first group in this continuum consists of a very small percentage of students (5-10%) who are in need of intensive and massive extra help. Such students are those who enter ninth grade testing at the third or even second grade level and still need to learn elementary level skills. Next along the continuum, there are a considerably larger number of students who have mastered the most basic skills but lack or have only weakly learned intermediate level skills. These students can decode but read with limited fluency. They can add, subtract, and multiply whole numbers, but struggle with fractions and decimals. These are the students who test at the fifth and sixth grade levels and essentially enter high school without the benefit of a middle school education. Then there is a third group consisting of students who are not fully prepared to succeed in standards-based courses because they have only partially mastered intermediate level skills and knowledge and have not developed the more advanced reading capabilities and mathematical reasoning strategies increasingly assumed by challenging high school work. In a different era, these students might have been left alone to develop the necessary skills and abilities as best they could while progressing through high school. The NAEP data indicate that this is the case for some students. The percentage of students at the 300 achievement level (more complex reasoning) increases from 15% to 40% in reading and from 23% to 65% in mathematics between the ages of 13 and 17. If the goal, however, is to have all students succeed in standards-based high school courses and to demonstrate this success by passing challenging end-of-course or graduation exams, then many of these students will need extra help and support.

The greatest need, then, is for strategies, courses, materials, and approaches which enable students to acquire and solidify intermediate level reading and mathematics skills while providing them with the more advanced reading comprehension and mathematical reasoning strategies they need in high school. In this sense, it is perhaps more accurate to view the extra-help needed by the majority of high school students not as remediation (since in many cases it is the norm), but rather as effective means to accelerate their learning so they can be prepared for and supported in the mastery of rigorous intellectual work.

What is Known About Programs and Strategies for Helping High School Students Catchup in Reading and Mathematics?

Although many high schools offer some form of remediation in mathematics and reading, these efforts are typically not grounded in a well-developed research base or supported by solid evaluations of effectiveness. Many are also misdirected (Greenleaf, Schoenbach, Mueller & Faye, 2001). There are only a handful of catch-up programs for high school students that are supported by current research on the needs of adolescents and for which some evaluation data exists.

Extra Help Reading Courses and Programs

In reading there are several recently developed extra-help or catch-up reading courses for high school students who can decode but who have weak fluency and struggle to comprehend advanced texts. The existing data indicate that these extra-help course can help students become better readers by teaching them explicit reading comprehension strategies and giving them opportunities to apply these new skills (Greenleaf et al., 2001; Allen, 2001; Codding, 2001; Balfanz & Jordan, 2001; Raiche & Showers, 2000; Fischer, 1999; Showers, Joyce, Scalon & Schnaubelt, 1998). There are also a growing number of reading skills programs which are aimed primarily at the small number of students who lack elementary reading skills and need instruction in phenomic awareness, decoding, and word attack skills, though they also contain fluency and comprehension components. Some of the more widely used examples for

which at least some evidence of effectiveness exists include Boys Town, Scholastic 180, Literature! (Greene, 1998), and Corrective Reading (Harris, Marchand-Martella & Martella, 2000). Most of the reading comprehension courses and reading skills programs for high school students have recently been developed. They have been implemented in a relatively small sample of schools. Thus, while the existing evaluations are promising and almost all indicate that the typical student can gain up to two grade levels in reading ability in one year of instruction, they are also sparse. In most cases, there is no more than one evaluation (often for a limited population of students) per program.

Extra Help Mathematics Courses and Programs

In mathematics, the research and evaluation base is even smaller. White, Porter, Gamoran and Smithson (1997) found generally positive effects for three high school transition courses they examined. Each of the courses—Math A in California, Stretch Regents in Rochester, NY, and the UCSMP Transition text as used in Buffalo, NY—attempted in somewhat different ways to provide under-prepared students with the knowledge, skills, and approaches they needed to succeed in college preparatory courses. To a significant degree, they succeeded. White et al found that students who took these transition courses were "much more successful than those in the general math track in obtaining college preparatory math credits" (p. 77) and showed greater achievement gains.

Beyond this single study, however, and our own work examining the impact of the Talent Development High School's Transition to Advanced Mathematics course-students at three field test schools gained a half year more in mathematics achievement than students in three matched control schools- (Balfanz & Jordan, 2001), we could not find any other evaluations of high school catchup courses in mathematics. A number of school districts are trying different variations of providing some or all students with extra time and/or extra support to learn algebra and other college preparatory mathematics courses. But to date the impact of these efforts has primarily been reported anecdotally (Olson, 2001). The one major exception is Equity 2000- a major effort launched by the College Board to dramatically increase the number of minority students taking algebra and geometry. The program was field tested throughout the 1990's in a number of urban school districts. Evaluations of Equity 2000 indicate that the elimination of lower or general track math courses combined with sustained professional development for teachers and modest student supports primarily in the form of Saturday academies enabled substantially more students to take and pass algebra and geometry (Fields, 1997; Everson & Dunham, 1996). The evaluations also indicate, however, that in several of the field test districts only slightly more than half the students taking algebra and geometry passed and that the extra-help provided through the Saturday academies was not a strong enough support for many students (Ham & Walker, 1999).

Some Consensus is Emerging on the Critical Components of Effective Extra Help

The systematic development and evaluation of research-based extra help programs and catch-up courses for high school students is in its infancy. There is , however, a somewhat larger research base, particularly in reading, on some of the key components of effective extra help.

Reading

There is growing agreement among literacy researchers on key elements of reading instruction for adolescents who have elementary level skills but are not fluent readers with strong comprehension strategies (Greenleaf et al., 2001; Allen, 2001; Codding, 2001; Harvey & Goudvis, 2000; Schoenbach et al., 1999; Moore, Bean, Birdyshaw, & Rycik, 1999).

Modeling comprehension strategies.

Teachers will demonstrate comprehension strategies to their class by various modeling approaches (Pressley, 2000). In the Talent Development High School's (TDHS) Strategic Reading course (Shaw, 2002) developed for first-term ninth graders, the teacher begins most classes with a "read-aloud and think-aloud" activity where a passage is orally presented with frequent pauses wherein the teacher indicates aloud that which is going through his or her mind related to the reading. These demonstrations use short passages from various fiction or nonfiction selections. Besides presenting a lively reading of the author's words with appropriate or even theatric inflections, the teacher regularly stops to specifically reflect on how one could mentally derive meaning and interpretations from the printed page. To guide teacher in read-aloud/think-aloud activities prompts are prepared with "Post-it" attachments at stopping points in the reading passage, giving specific suggestions of comprehension strategies to mention at appropriate times.

Students can also participate in read-aloud/think-aloud activities as they individually demonstrate the method by which they mentally interact with a reading selection. Teachers can ask questions on how the student reader relates the reading to personal experiences, or thinking about what comes next in a story, or other avenues of reasoning with the author. Peers can compare their different kinds of reader reactions to the same passage and discover how each may contribute to comprehension and understanding (Taylor & Mosheim, 2001; Alfassi, 1998).

MINI-LESSONS.

Concise and focused instruction directly related to the texts students are reading and the challenges they are facing in comprehending it are another critical element of extra help. Mini-lessons can be used to strengthen student's language arts skills and strategies including understanding of root words, prefixes, suffixes, and the multiple meaning of words. Many elements of the writer's craft can also be taught directly in teacher-led lessons. Topics can include comprehension tools (Webs or Venn diagrams for cause-effect, time sequence, main idea and supporting evidence, etc.), figures of speech (alliteration, ...), literary devices (symbolism, irony, .), and plot and character development (dialogue, events, italics, and punctuation) (Sinatra, 2000). Lessons may focus on literary devices within the various genre of fiction and nonfiction works (Codding, 2001). Techniques can be presented in pre-reading for initial expectations, reading and rereading to clarify meaning, and reflection after reading to retain and interpret information (Pressley, 2000).

COOPERATIVE LEARNING TEAM AND PARTNER DISCUSSION.

Students can work together in cooperative learning teams or partnerships to improve both their fluency and their comprehension strategies (Fuchs, Fuchs, & Kazdan, 1999; Alfassi, 1998). Pairs of students can alternate reading aloud to one another to practice reading fluency with peer assistance and feedback when appropriate by sitting student pairs close together in the classroom and using low enough voices so that entire class can practice oral reading without the inefficiencies possible when a single student reads to the whole class. The teacher can circulate amongst pairs to observe individual student needs that may need further direct instruction or practice in whole-group or tutorial sessions.

Guided discussions in student learning teams can also promote vocabulary development and comprehension strategies. In the TDHS Strategic Reading course, Partner Discussion Guides (PDG) have been prepared for each novel or play used in the English syllabus. These PDGs identify new vocabulary words and ask comprehension questions for short sections or chapters of each work. Students are instructed in how to use new vocabulary words in "meaningful sentences" that use modifiers and elaboration clauses so the word in question could not be easily replaced with another word and retain the intended meaning. Student discussion is also guided by questions about characters and plots that use comprehension strategies such as prediction, relation to personal experiences, and recognition of the writer's craft. Presentations to the whole class from group discussions can be another learning opportunity as the teacher helps contrast and critique different comprehension approaches (Schoenbach et al., 1999). Ordinarily, student discussions in teams of comprehension questions are not used for assessments of individual competencies but as practice for tests that may follow on an individual basis.

SELF-SELECTED READING.

Since reading fluency is also a function of the amount of time devoted to serious reading in one's life, the more often students read during school time the more fluent they will become. Thus, another common element of high school programs designed to increase reading skills is finding time and high-interest materials for self-selected reading where individual students select a book or magazine to read on their own during school time (Allen, 2001; Codding, 2001). In TDHS Strategic Reading, the final 20 minutes of each 90-minute period is available for self-selected reading. Each classroom has a small library of books and magazines from which students choose an item for their private reading. The items in this library are selected for content that interests most teenagers. Logs and journals are used to record what each student expected and gained from each selection. Some separate learning stations with audio books that can be followed in print and with writing aides are also available for occasional student use during this portion of the class period.

MATCHING MATERIALS WITH STUDENTS

To address student motivation in assigned or self-selected reading, the match with a student's reading skill level and content areas of interest are very important. Often struggling readers are poorly motivated to undertake additional reading, either because they are embarrassed

to reveal weaknesses or because they have a history of frustration and failure with reading. Thus it is important to offer reading materials at a level that will not further frustrate student efforts which are close to the individual's current grasp of recognizing most of the vocabulary in sentences and paragraphs of manageable length. At the same time, the reading selections should cover topics or invoke characters and situations that will be appropriate to teenagers' interests and experiences (Allen, 2001; Showers, Joyce, Scalon & Schnaubelt, 1998).

Mathematics

Unlike reading, mathematics does not have a small but long-standing body of research that has examined the challenges and needs of adolescents who enter high school in need of extra help. It is possible, however, to gather some insight into the nature of effective help in mathematics by considering several current bodies of research. The National Research Council synthesis of research on learning mathematics (Kilpatrick, Swafford, & Findell, 2001) highlights several core elements of extra help. On non-routine problems, students need to learn to slow down and ask themselves some guiding questions. Many students who are not skilled at mathematical reasoning are so, in part, because they do not allow themselves the time to reason. They quickly attempt to deduce which operations are called for and then apply them to the numbers in the problem without determining whether this is the appropriate solution (Chazen, 2000). Students who have not mastered intermediate skills with rational numbers and integers need to develop conceptual understanding of these operations and learn the standard algorithms. Many students also need help learning the language and symbol systems of mathematics and understanding how mathematics terminology differs from everyday speech (Lodholz, 1990). Finally, students needing extra-help in mathematics need sufficient guided practice both to internalize procedures and to learn how to apply their mathematical knowledge to non-routine problems.

Bottge (2001), in a synthesis of research on students with learning difficulties, argues that effective instruction for low-achieving students in mathematics should involve several elements, including meaningful problems which engage students, explicit instruction in foundational knowledge and skills, use of students' informal knowledge and intuitions, and shared dialogue about challenging mathematical tasks. Some or all of these approaches have also been employed by a number of mathematical reform efforts which have had success with students who have been traditionally viewed as low achieving (Chazan, 2000; Stetzer, 1993) including the Algebra Project (Moses, 2001) and the transition courses studied by White et al. (1997).

Finally, a body of evidence is beginning to emerge from the initial long-term evaluations of the reform mathematics curriculums developed with support from the National Science Foundation in the late 1980's and early 1990's. This evidence indicates that organizing instruction to develop students' conceptual understanding can lead to significant gains in problem solving and mathematical reasoning skills (Schoenfeld, 2002; Riordin & Noyce, 2001; McCaffrey et al., 2001) without a deteriation in students' basic computation skills.

The Talent Development Transition to Advanced Mathematics (Waltemeyer & Balfanz, 2002) course, taken by students who enter the ninth grade behind grade level, attempts to bring together all of these elements. It begins with a Problem of the Day which asks students to draw upon their everyday mathematical knowledge and insights to determine if a statement like "My friend said we could walk to California from Baltimore is five days" makes sense and to support their view with mathematical evidence. Students typically work with a partner to solve the problem, after which various solutions are shared and discussed by the class. This is followed by direct instruction by the teacher who uses a repertoire of active and cooperative learning techniques (Choike, 2000) to engage the class and enable students to develop conceptual understanding of key mathematical concepts. The class then concludes by having the students practice and apply what they have learned in small groups or independently. Initial evaluations of the course reveal that students had a higher level of engagement and achievement than students in the control group, who were enrolled in a traditional remedial course that drilled students in core mathematical procedures (Balfanz & Jordan, 2001).

Motivational Aspects

In addition to skill and strategy components, there is a growing recognition that motivational factors play a key role in the extent to which extra help is effective for high school students. Adolescents will often react negatively if the course materials appear babyish or too closely resemble the instructional materials and approaches they have used in elementary and middle school. There is evidence that high school students will

respond to strong incentives to take learning seriously (like the threat of mandatory summer school) but only if they feel they have a reasonable chance of succeeding if they put in extra work (Roderick & Engel, 2001). Thus it is critical age appropriate materials be developed and that extra help opportunities be presented to students in a way that clearly communicates that additional effort on their part, combined with additional learning opportunities, will provide an obtainable path towards success. In addition, learning activities need to be structured so that students can experience success, receive positive reinforcement, and exercise some control over their learning process (Randhawa, Beamer, & Lundberg, 1993; O'Brien, Dillion, & Wellinski, 1997).

Existing Extra Help Programs and Research Provide Hope But Considerable Research, Development, and Evaluation Remains to be Done

The existing research-based extra-help programs for high school students in mathematics and reading are promising. They show that reading and mathematical skills and strategies of students who enter high school multiple years behind grade level can be accelerated. The magnitude of the observed achievement gains, moreover, suggests that with continued support and help students who enter high school poorly prepared for standards-based work can be placed on a trajectory that brings them up to grade level by the 11th or 12th grade.

The existing research and development efforts, however, also clearly indicate that the field is in its infancy. Many important questions about the most effective methods and approaches of providing extra help to high school students wait to be answered. For example, we need to know more about the costs and benefits of integrating extra-help and support into existing English and mathematics courses versus creating stand-alone extra help courses. We need more insight into how quickly the learning of intermediate skills, as well as mathematical reasoning and reading comprehension strategies, can be accelerated in a diversity of school settings. We also need to find out if the initial promising results described above will hold up in multiple sites over multiple years. Nearly all of the existing programs and approaches also report that some of the students they attempted to serve did not improve their skills and strategies. More investigation into why this occurs and the development of alternative strategies for these students is warranted. Finally, development work is needed to create more of the basic materials needed in extra help coursework, including engaging works of literature that are accessible to adolescents with fifth and sixth grade reading levels and problem sets in mathematics which allow students to practice their intermediate skills while reasoning.

Perhaps most significantly, nearly all of the extra-help courses and approaches developed to date are designed for—at most—a year in duration. What still waits to be developed is a multifaceted, multi-year, comprehensive approach to extra help for high school students. We have been working for several years to develop the Talent Development High School Model for high poverty, nonselective high schools. Currently, we are about half way through the development of our approach to extra-help. When it is completed, we envision high schools in which entering freshmen at grade level or below will take three first- semester, 90-minute per day transition courses in the ninth grade—Freshmen Seminar, Strategic Reading, and Transition to Advanced Mathematics—as part of yearlong double doses in math, English, and social studies (i.e. students take these subjects for 90 minutes a day throughout the year). The ninth graders most in need of extra support in literacy will receive additional instruction in reading and writing in the Literacy Lab, which has sections tailored both to students lacking elementary reading skills and students whose primary roadblocks to greater fluency and comprehension are motivational in nature. Students still behind grade level in 10th grade will continue to take a double dose of English and mathematics, taking Reading and Writing in Your Career and Talent Development Geometry in the first semester followed by English II and Geometry in the second semester. In the 11th grade, the focus shifts to preparing students to succeed in college. Students will be offered a yearlong 90-minute-a-day Algebra II and a reading and writing course aimed at developing college level skills. Finally, in the 12th grade, students will take a capstone senior seminar and students in need will continue to get additional support in learning labs to help them succeed in precalculus or statistics and English IV. In addition, throughout high school, students have access to after-school, Saturday school, and summer school supports. There is a considerable need for more efforts to be developed along these lines, particularly in high poverty high schools.

Policy Implications and Challenges of Providing Extra Help in Reading and Mathematics to High School Students

While the necessary research, development, and evaluation work continues to create effective and comprehensive extra help programs and approaches for high school students, there are policy issues and challenges that need to be analyzed and solved.

Time for Substantial Extra Help Needs to be Found During the School Day

A growing number of school districts are responding to the need to provide high school students with the extra support needed to meet promotion and graduation requirements by establishing summer school and Saturday school programs. These programs have an important role to play in providing students with some of the comprehensive extra-help they need (Roderick & Engel, 2001). The available evidence, however, suggests that Saturday and summer school programs alone will not be enough to insure that all students receive the support they need (Ham & Walker, 1999). Existing summer school programs for high school students have typically not had strong attendance rates (Olson, 2001). Linking summer school to mandated promotion and graduation requirements might increase attendance. This might, however, also narrow the curriculum to direct preparation for the tests students need to pass, making it less likely that students will be instructed in the intermediate mathematics and reading skills and reading comprehension and mathematical reasoning strategies identified in this paper as many students' primary extra-help needs (Madaus & Clarke, 2001).

Finding time during the school day, however, will not be easy. Increasing graduation requirements leave less room for electives. One solution is block scheduling, which can increase the total number of courses available to students from 28 in a traditional seven-period day (seven courses per year over four years) to 32 in a 4 by 4 block schedule (four course per semester over four years). In the Talent Development High School model, for example, students take catch-up extra help courses in mathematics and reading during the first semester in 90-minute periods, followed by the school district's standards-based mathematics and English courses during the second semester. For students in need of extra help, this approach to scheduling greatly increases the academic intensity of their high school experience. Whereas before the students would have taken four core subjects and three electives, many students now take academic courses in seven out of their eight class periods during the year. This is just one possibility. A number of school districts including San Diego, Boston, and Chicago, have begun to develop extensive extra-help programs and supports, and are experimenting with different means and modalities of delivering them. The different organizational choices they make and the consequent impacts need to be closely studied. Cost/benefit analysis of increasing the school day or school year to provide more time for extra help also needs to be conducted.

Attempts to Provide Extra Help Need to Avoid Triggering the re-Emergence of Dead End Tracks and Remediation

To be effective, extra-help cannot prevent students from completing a college preparatory sequence of standards-based courses. A danger of placing a great deal of attention on the extra help needs of incoming students is that it could lead to the creation of special programs, classes, or tracks that are difficult to leave (Olson, 2001; Greenleaf at al., 2001). For example, requiring students to pass extra help courses or reach a certain level of achievement on standardized tests before allowing them to take grade level courses may make it impossible for students needing extra help to partake in a college preparatory track. Extra help needs to be conceptualized not as a filter or gate but as extra support provided to students while they are engaged in a sequence of standards-based high school courses. Accordingly, temptations for quick administrative fixes which create special transition grades for students multiple years behind grade level need to be resisted until there is evidence that students from these programs, succeed in standards-based courses, and graduate (Hauser, 2001).

The Importance of Teacher Quality Needs to be Recognized and Confronted

Traditionally, teaching remedial classes has been viewed as low-status work in high schools. Moreover, in many high poverty high schools, where the extra help demands are the greatest, it is not unusual for large numbers of ninth graders to be

taught by non-certified teachers, out-of-field teachers, and long-term substitutes (Baltimore City Public School System, 2001). Yet all of the emerging evidence on the impact of teacher quality makes clear that students in need of substantial extra help need access to excellent teachers. The most effective extra help curriculum in the world will have little impact if it is taught by a teacher who lacks the skills or desire to implement it. This means that policies and incentives will have to be designed to make providing extra help higher status work and to increase the supply of qualified teachers in high poverty high schools. In addition, it will also be critical to recognize that even skilled teachers will need implementation support in the form of on-going professional development, in-classroom coaching, and teacher networks to learn the skills and approaches needed to teach catch-up reading and mathematics courses. All of the recently developed reading comprehension courses, for example, require substantial professional development (Raiche & Showers, 2000). Finding the funds and time for sustained professional development, however, is currently a challenge that is often not met.

In Low Performing High Schools Extra-Help Needs Occur in the Context of Comprehensive Whole School Reform

Effective extra-help curricula and good teachers will have limited impact if, as in many high poverty high schools, up to three quarters of the students continue to be absent from school a month or more each year (Neild & Balfanz, 2001). In low performing schools, a comprehensive approach to extra-help needs to be accompanied by organizational, instructional, and teacher support reforms which create serious learning climates that attenuate student apathy and increase student attendance (McPartland & Jordan, 2001). Simply building an extra-help support system within a chaotic and unfocused school will not succeed.

The Federal Role

There are a number of important roles to be played by the federal government in providing high school students with the extra-help they need to succeed in a standards-driven era. There is an urgent need for more research into the types of extra help students need, more development of effective extra help courses and materials, and more evaluation to establish the effectiveness of different approaches and organizations of extra help. Schools will need support to fund comprehensive extra help programs. This could, in part, be accomplished by directing a greater share of Title 1 funds to high schools or by having separate grant competitions for the development and implementation of effective extra-help programs in reading and mathematics. The federal government also needs to be an advocate for providing extra help to high school students. To often it is assumed that students cannot recover from poor elementary schooling and hence all reform efforts should be located in the early years. As the body of knowledge about providing effective extra help to high school students increases it needs to be widely disseminated to policymakers and the public.

The federal government also needs to concern itself with the high poverty high schools where the greatest extra-help needs exist. There are about 250 high schools in the nation's 35 largest cities, where the senior class has 50% or fewer students than the entering freshmen class four years earlier. These schools are predominately attended by minority students and are responsible for many of the nation's dropouts (Balfanz & Legters, 2001). These are also usually weak institutions. Unable to promote less than half of their students to the 12th grade in a timely fashion prior to the most recent wave of promotion requirements and graduation exams (Balfanz & Legters, 2001) the challenges they now face are enormous (Neild & Balfanz, 2001). At the same time, these schools are not well positioned enough to acquire the human, technical, and financial resources they need to reform. Locally, the schools need to compete for resources with the selective and magnet high schools, as well as early grade initiatives. The federal government needs to play a significant role in monitoring, supporting, and shepherding the transformation of these schools into strong learning institutions.

Conclusion

Hopefully someday improvements in elementary and middle schooling combined with strong incentives for student learning will obviate the need for much of the extra help high school students currently need in reading and mathematics. In the transition to a high-standards era, however, the level of performance desired for and increasingly required of all students is rising faster than our ability to provide everyone with high quality K-8 schooling. As a result, there is a considerable need to develop effective extra help strategies, approaches, and organizational structures for high

school students. Extra help needs in reading and mathematics are greatest in high poverty high schools but, as this paper has shown, if the goal is to have all high school students engage in an intellectually rigorous sequence of high school courses, most high schools in the United States will need to develop extra help programs and supports for significant numbers of their students. This paper has also shown that in a high standards era the nature and type of extra help high school students require needs to be re-conceptualized. The primary need is not remediation in the most basic elementary level skills, but rather organized learning opportunities to accelerate students' acquisition of intermediate level skills (e.g. fluency and vocabulary in reading and operating with rational numbers and integers in mathematics) and more advanced reading comprehension and mathematical reasoning strategies.

Developing and implementing effective extra help supports for high school students in a high standards era will not be easy. Providing large numbers of students with extra help so they can succeed in challenging courses is not part of the existing organization or culture of high schools. Our knowledge of how to provide extra help to high school students and the development of materials, approaches, and organizations that do it successfully is still in its infancy. Initial attempts to develop extra help approaches that are based on current understandings of the type of supports and skills adolescents need to partake in rigorous high school courses, however, have shown promising results. These attempts indicate that it is possible to accelerate the learning of students who enter high school multiple years behind grade level and equip them with the skills and strategies needed to succeed in standards-based work. What is needed now is a sustained research, development, and evaluation effort which builds upon the emerging knowledge base to create a comprehensive and multifaceted approach to extra help in high school which insures that all students can get the support they need to master standards-based coursework.

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This paper was prepared for the Office of Vocational and Adult Education, U.S. Department of Education pursuant to contract no. ED-99-CO-0160. The findings and opinions expressed in this paper do not necessarily reflect the position or policies of the U.S. Department of Education. This manuscript can be found at http://www.ed.gov/offices/OVAE/HS/commisspap. html

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