

# *Student Readiness for Postsecondary Endeavors*

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By

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# *Student Readiness for Postsecondary Endeavors*

## **Introduction**

Too many students who successfully complete high school are nevertheless unprepared for the array of possibilities that face them in the postsecondary world. This is the claim made by a number of authors over the last three decades (e.g., Bock & Moore, 1986, Greene & Forster, 2003; Sum, 1999; and U.S. Department of Labor, 1991). Whether the goal is further education, a job, or enlistment in the military, there are those who say that high school graduates (and by implication those who do not graduate) are unprepared because of a lack of basic skills attained in the public schools. In effect, it has been asserted that a gap exists between students' abilities on the one hand and the requirements of the workplace, the military and postsecondary educational institutions on the other. Some authors (e.g., Kirsch, Jungeblut, Jenkins & Kolstad, 1993) have questioned whether adults have even developed enough basic literacy and numeracy skills to function effectively as citizens.

A variety of results have been cited to support these views. Some reports focus on student behaviors and attainments, such as high school dropout rates and/or graduation rates (e.g., Greene & Forster, 2003; Horn, 1998). Some focus on analogous later events, such as the rates at which college students require remediation or fail to complete their program of study (U.S. Department of Education, National Center for Education Statistics [NCES], 2003; Rosenbaum, 2004). Others focus on the skill demands of the workplace in contrast to what students have been taught in school (Parker, 2004; Pennsylvania Department of Education, 2004). Still others focus on the literacy demands of citizenship (Kirsch, Jungeblut, Jenkins, & Kolstad, 1993). College transcripts, student course completions, and finally, student performance have all been used as indicators of college readiness (Sanderson, Dugoni, Rasinski, Taylor, & Carroll, 1996; U.S. Department of Education, NCES, 1999).

Although analyses of postsecondary readiness typically focus on skills and knowledge in the areas of reading and mathematics, this paper restricts attention to reading ability in the belief that many of the central issues will be similar for mathematics. Even if previous researchers are correct and there is a gap between the reading ability of high school students and the reading requirements of postsecondary life, this is still only half the story.

No one has actually examined the text demands of high school in contrast to those of college, the workplace, the military, and citizenship to determine if there is a gap in literacy requirements. If such a gap exists, then an apparent gap in student performance or preparedness could be a function of different text demands rather than purely a gap in student ability. Put another way, graduates may have learned very well what they were taught; but if there is a gap between the literacy demands of the high school curriculum and the requirements of various postsecondary endeavors, then students will still appear to be unprepared.

To ascertain whether the gap is purely an ability gap or whether there is also a textual gap requires that both ability and textual difficulty be measured. The current paper addresses the text side of the picture. By analyzing a range of textual material from K-12 education, postsecondary education, the military, the workplace and citizenship, it will be possible to more objectively consider whether there is a gap in text difficulty between these various endeavors of life. This is done without losing sight of the reading ability side of the issue. The approach to text will suggest a similar effort with respect to students' reading ability in these various roles in an effort to more systematically address the issue of student readiness for life after the K-12 years. Consequently, it is essential to use a method that places both text and student ability on the same scale. Using The Lexile Framework<sup>®</sup> for Reading, this paper directly addresses the issue of whether there is a gap between high school textbooks and various reading materials in the most widely chosen postsecondary domains of endeavor.

The approach of this paper is intended to be illustrative and does not constitute an exhaustive investigation. Nor is it the purpose of this paper to provide a complete review of literature or extant data sources about student readiness. Rather, a few readily available articles and reports are described to motivate the investigation and to give a flavor of the views expressed by previous writers. The conceptual framework for the approach to text is the key issue of importance for future investigations. The results that are presented will provide a sample of what a more exhaustive analysis could show.

In the process of investigating the text continuum from high school to postsecondary endeavors, this paper suggests a more systematic effort to identify and quantify the reading ability gap and the text demand gap in terms of a metric for both ability and text difficulty. The advantages are more meaningful measurement of reading ability in light of text demands and findings that are more conducive to instructional interventions and policy actions.

The paper is organized as follows. First, there is a brief review of literature on student readiness for postsecondary reading requirements. This is followed by a description of the methodology used to analyze texts for this paper. After that, results are presented to describe the text demand for high schools, postsecondary education, the workplace, the military, and selected activities of citizenship. The paper concludes with a summary and a discussion of the results and desirable next steps.

### **Review of Resources and Literature on Student Readiness**

The resources used for this paper are organized into four domains that correspond to the three major postsecondary endeavors that students can choose—further education, the workplace or the military—and, the broad area of citizenship, which cuts across all postsecondary endeavors. This section discusses the resources and summarizes some of the literature pertaining to student performance and readiness in each of the four domains.

This paper draws on selected studies and recent literature related to student readiness for postsecondary endeavors to characterize the widely accepted view that there is a student readiness gap. In the domain of K-12 education, there is a wealth of material ranging from analyses done by United States governmental agencies, to journal articles and monographs published by university faculty and/or private institutions, to reports in state and national newspapers, to informal pieces available online from different writers.

Student performance in K-12 is well documented by such national efforts as the National Assessment of Educational Progress (NAEP) and the National Education Longitudinal Study (NELS). The transition from high school to postsecondary education is explored through such studies as the NAEP High School Transcript Studies (HSTS), High School and Beyond (HS&B), and the National Longitudinal Study (NLS). There have been numerous reports based on the data collected through these efforts (e.g., Carroll (1988, 1989); Knepper (1990); Sanderson, Dugoni, Rasinski, Taylor & Carroll (1996)).

There are relatively fewer sources available relating to actual measured reading ability of young adults in the domain of postsecondary (13-16) education. At the federal level, the Postsecondary Education Descriptive Analysis Reports (PEDAR) focus primarily on policy issues such as access, financing, persistence, degree attainment, etc. However these findings have been integrated with data from HS&B, HSTS, and NELS—see Horn (1998) and U.S. Department of Education, National Center for Education Statistics (1999) for examples.

Other reports have focused specifically on the issue of postsecondary readiness. Some were commissioned by federal authorities, as was the case with the report of the Secretary's Commission on Achieving Necessary Skills (SCANS) issued by the U.S. Department of Labor (1991). Some have appeared in other quarters, such as Greene and Forster's (2003) paper issued from the Center for Civic Innovation at the Manhattan Institute. Some reports have appeared through major university affiliates, as was the case with researchers Venezia, Kirst, and Antonio (2003) at the Stanford Institute for Higher Education Research.

There are few sources that inform about actual measured reading ability in the workplace, the military and citizenship. However, there have been a few national studies conducted by the federal government that relate to these domains. The 1991 Assessment of the Literacy of Job Seekers and the 2003 National Assessments of Adult Literacy (NAAL) are relevant to the workplace. The *Profile of America Youth* pertains especially to the military. NAAL, the 1992 National Adult Literacy Survey (NALS) and the 1985 Young Adult Literacy Assessment also inform about student's preparation for their citizenship roles. The National Center for Education Statistics provides information on its website for all of these reports except for the *Profile of American Youth*, which can be found through the website for the Bureau of Labor Statistics.

The following subsections summarize selected literature in the area of student readiness. The review is organized into the domains of education (K-12 and 13-16), the workplace, the military and citizenship.

### **Education (K-12)**

Researchers acknowledge that formal schooling is related to adult literacy (Kaestle, Campbell, Finn, Johnson, & Mickulecky, 2001) and that schools have an important role to play in setting, promoting and raising community achievement standards (Bock & Moore, 1986). However, reports of performance on the National Assessment of Educational Progress (NAEP) highlight the relatively small percentages of students in grades 4, 8 and 12 who perform at or above the NAEP *Proficient* level (U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003a & 2003b).

Using high school transcript data for the 1988 eighth grade cohort from NELS:88, Sanderson, Dugoni, Sasinski, Taylor & Carroll (1996) concluded that approximately 62% of the cohort pursued college preparation programs, whereas 38% followed a general or vocational track. Based on a study of 1992 graduates, Horn (1998) concluded that about 44% of at-risk students were “at least minimally prepared academically” to attend a four-year college and that 75% of students not at-risk were prepared. Greene and Forster (2003) were less optimistic, claiming that “only 32% of all students leave high school qualified to attend four-year colleges.”

During the last three decades of the 20<sup>th</sup> century, a number of states implemented high school testing requirements for graduation. Some of these evolved into exit exams by the turn of the millennium. However, a report published by Achieve, Inc. (2004) asserted there was a gap between such tests and the requirements of colleges and employers, and insinuated that such exams were not demanding enough of high school students. Greene (2000) estimated that a lack of basic skills attained by high school graduates was costing the United States approximately \$16.6 billion each year.

### **Education (13-16)**

A number of researchers have studied college entrance, persistence and remedial course-taking patterns among college students. Using HS&B data, Carroll (1988) noted that a little less than half of the 1980 and 1982 high school seniors entered postsecondary institutions directly after graduation. In a subsequent study, Carroll (1989) found that about 57% of graduates who immediately entered four-year colleges actually persisted full time for four years, and about 75% of those received their bachelor’s degrees. Knepper (1990) found that less than a fourth (22%) of the 1980 HS&B cohort who entered postsecondary education right after high school completed a bachelor’s degree in 4.5 years. This was nearly ten percentage points lower than for the 1972 cohort from the NLS:72. Citing previous research, Venezio, Kirst and Antonio (2003) recently reported, “Eighty-eight percent of 8<sup>th</sup> graders expect to participate in some form of postsecondary education, and approximately 70 percent of high school graduates actually do go to college within two years of graduating.” (p. 2)

However, the U.S. Department of Education, National Center for Education Statistics (2003) reported that 28% of entering freshmen in the fall of 2000 enrolled in at least one remedial reading, writing or mathematics course. Rosenbaum (2004) calculated that 44% from the class of 1982 and 25% from the class of 1992 took at least one remedial course.

In an earlier report, NCES (1999) had noted that students' academic preparation, test scores, and academic performance in the first year of postsecondary education were all related to the number of course credits that they completed in their first year of college. Similarly, Rosenbaum (2004) asserted, "For students with high school averages of C or lower, the chances that they will earn even one college credit are less than 50-50." (p. 1)

Venezia, Kirst and Antonio (2003) provided an insightful evaluation of the institutional and organizational conditions that characterize the transition from high school to college. In their report, *Betraying the College Dream*, they say:

"... high school assessments often stress different knowledge and skills than do college entrance and placement requirements. Similarly, the coursework between high school and college is not connected; students graduate from high school under one set of standards and, three months later, are required to meet a whole new set of standards in college. Current data systems are not equipped to address students' needs across systems, and no one is held accountable for issues related to student transitions from high school to college." (p. 1)

### **Workplace**

In June, 1991 the U.S. Department of Labor issued a report based on the Secretary's Commission on Achieving Necessary Skills. Accordingly, it has become known as the SCANS report. In the report, the Department made the dramatic statement: "... more than half of our young people leave school without the knowledge or foundation required to find and hold a good job." (p. i) This result was based on an analysis of skills in the workplace and an analysis of what was measured by the 1986 NAEP survey of 21 to 25 year olds. NAEP did not assess the SCANS competencies, but from this comparison the Department constructed its estimate. Although the report admitted that they could not know exactly how many young people lacked the SCANS identified skills, the estimate persisted and the sentiment has been echoed by others.

Fortunately, further research has been done to investigate the requirements of the workforce. A significant body of work has been contributed by the International Center for Leadership in Education (ICLE). They have collected samples of reading materials from numerous occupations cutting across 16 career clusters identified by the U.S. Department of Education. They have measured the reading demand of the materials and made the information available to states and educators. This work is described further in the methodology section because their data are incorporated into this research.

In a recent study the Pennsylvania Department of Education (2004) evaluated their curriculum materials against the materials accumulated by ICLE. They found that "society in general and the workplace in particular demand higher levels of reading proficiency than schools." (p. 3) In a news report that same year, Parker (2004) stated, "Many high school sophomores and seniors had difficulty reading above a 1,000 Lexile [denoted 1000L] rating, according to [Florida] state testing."



## **Military**

The U.S. Department of Defense (1998) found that reading levels were higher in the enlisted military than in the non-military sector. They characterized the mean reading level of active duty personnel without prior military service as typical of an 11<sup>th</sup> grade student compared to a mean for civilian youth that was in the range of 10<sup>th</sup> graders. [Note: Typical reader measures are approximately 940L-1210L for eleventh to twelfth graders, and approximately 905L-1195L for tenth graders.]

In a study of performance on the Armed Services Vocational Aptitude Battery (ASVAB), Bock and Moore (1986) found that performance stayed near the level of the highest grade completed in school. They concluded, "...failure to complete high school argues poorly for meeting vocational test standards at a later time through informal learning and experience." (p. 113)

## **Citizenship**

The 1992 National Adult Literacy Survey (NALS) measured prose, document and quantitative literacy with a national sample of adults. In reporting the findings Kirsch, Jungeblut, Jenkins & Kolstad (1993) found 21-23 percent of respondents had skills in the lowest level (Level I) on the three types of literacy. About 25-28 percent had scores in the next highest level. Sum (2000) noted that those in the labor force had higher literacy skills than those who were unemployed; however, over 40% of those in the labor force had literacy scores in the lowest two levels. Adding that very few (less than 5%) of the labor force had received any recent training in these skills, Sum concluded dismally, "Together these findings paint a bleak outlook for the future of the United States labor market."

As can be seen in this section, over the last few decades numerous authors cited problems with student performance or made the case that students are unprepared for postsecondary endeavors, but none have addressed the issue of whether there is a gap in the text requirements of high school and postsecondary activities.

## **Methodology**

The approach used to investigate textual difficulty for this research is explained in the following sections. There are two main issues: the metric for measuring text difficulty, and the specific texts to be measured in each domain.

### **The Lexile Framework for Reading**

The Lexile Framework for Reading is an approach to reading measurement that matches readers with text. The Lexile Framework measures both reader ability and text difficulty on the same scale, called the Lexile<sup>®</sup> scale. This approach enables educators to better manage reading comprehension and encourage reader progress through well-targeted reading instruction (Stenner, 2003).

The Lexile Framework was developed by MetaMetrics, Inc., an independent educational research and development organization focused on using technology to bridge assessment

and instruction. It has since become a widely adopted reading measure among educators, as well as test and textbook publishers.

A Lexile measure expresses a reading ability or text difficulty as a numerical score, followed by the letter, L. The measure is based on two well-established predictors of how difficult a text is to comprehend—semantic difficulty and syntactic complexity (Stenner & Burdick, 1997).

The test development model underlying the Lexile scale is the Rasch measurement model (Wright & Linacre, 1994), thus giving the scale a foundation in modern measurement theory. Lexile measures for students are obtained from tests that have been psychometrically linked to the Lexile scale by means of a formal linking study.

The scale is developmental in nature and spans the K-12 achievement and text continua. Scores range from below 200L for beginning readers/text to above 1700L for advanced readers/text.

Regrettably, few researchers have used the Lexile scale when investigating the readiness of students for postsecondary endeavors in life. Because of its utility in measuring both students and texts it is ideally suited to this research.

### **Identification and Description of Texts**

More than 50,000 books and 70 million newspaper and magazine articles have received Lexile measures to date. Some of these books and articles were measured by various users and are not generally available for inspection. However, tens of thousands of books are searchable in the online Lexile Titles Database maintained by MetaMetrics, Inc. ([www.Lexile.com](http://www.Lexile.com)); and, tens of millions of articles are searchable in periodical databases. [These are a subset of the "measured" books and articles. The actual number available at any given time fluctuates and depends on the number of titles added to the Lexile Titles Database and the number of measured articles to which major users (e.g., ProQuest and EBSCO) choose to attach a Lexile measure in their databases.]

For this paper, textual sources for K-12 education were drawn from the extensive library that has been built and maintained by MetaMetrics, Inc. over the last 20 years. Included in this library are over 4,400 textbooks used in the public schools of the United States. Each of these texts has been measured on the Lexile scale and possesses a Lexile measure that represents its reading demand.

This paper benefits from a recent (Fall 2005) survey of high school textbooks completed by MetaMetrics, Inc. to improve the representation of high school texts in its textbook database. The survey began with a review of information published by state departments of education in the United States. From this beginning, text collection focused on the adoption titles from five typical states: North Carolina, Texas, Oregon, Indiana and Florida. Adopted textbooks were organized into six content categories: Health, Social Studies, Science, Literature/Reading, Language Arts and Mathematics.

The major textbook series and their publishers were identified, and care was taken to ensure that all books in a series (i.e., all grades 9-12) were included. This list was then matched with the titles in the existing MetaMetrics database to determine which books had already been measured and which would need to be measured. Once the list was established, the most typical books representative of the major publishers and their products were identified, eliminating less common or idiosyncratic books. The selected books that needed to be measured were then acquired and the Lexile measures determined.

Once the textbook database was enhanced with the newly measured high school texts, it contained 175 texts used in the high school grades (9-12); among these 75 were specifically coded as being 11<sup>th</sup> grade or 12<sup>th</sup> grade texts. These 75 were selected for statistical summary for this paper. (This paper focuses on texts for the last two years of high school compared to the first two years of university and community college to specifically represent the text gap between high school and postsecondary education, if there is one.)

Questia Media America, Inc. provided the resources for texts used at the beginning of community college and the university (13-14). As a library, Questia focuses on texts used in the humanities and social sciences. For this study, Questia focused on university courses that most if not all freshmen and sophomores will have to take, and selected 100 titles for analysis. Similarly, they selected 50 titles representing materials that students in community colleges typically encounter. Questia analyzed these texts to assign Lexile measures. (This was possible using software called the Lexile Analyzer, provided by MetaMetrics, Inc. and described in more detail below.)

Texts selected for the beginning (freshman and sophomore years) of university education reflected the content often required in the following courses (among others):

- American Literature
- English Composition
- World Literature
- US History
- World History and Civilization
- Psychology and/or Sociology
- Philosophy
- Understanding Humanities
- Music or Theater or Visual Art Appreciation
- Introduction to Business
- Introduction to Economics
- Introduction to Education

For community college, the books selected from the Questia collection represent the variety of materials used in the most popular fields of community college study. The fields of study include: business, social and community service, health, education, design/arts, and technology/science.

Questia analyzed these university and community college texts to produce Lexile measures for each text. These Lexile measures were incorporated into the database for this study, then summarized statistically by the author for this paper.

In the workplace domain, this study draws upon the previous work of Willard R. Daggett of the International Center for Leadership in Education (ICLE). Dr. Daggett has independently analyzed over 1,400 examples of occupational reading material that have been classified into 16 career clusters identified by the U.S. Department of Education. ICLE used the Lexile Analyzer provided by MetaMetrics, Inc. to determine the Lexile measure for each text. The resulting database was provided to the author and analyzed for this paper to obtain a summary of the Lexile measures for workplace materials.

For the military domain, material was acquired through the U.S. Army website. First, selected army news service articles were analyzed for their reading demand. Second, selected articles were analyzed from the Professional Writing Collection featured on the Army website. Third, the document *225 Years of Service* was used, as it appeared to be a featured general paper on the history of the military. Fourth, the *Soldier's Handbook* was analyzed. Finally, the reading demand was calculated for a selection of field manuals, training circulars, drills and other documents used for various branches of the armed services. In general, these are official departmental publications available from the General Dennis J. Reimer Training and Doctrine Digital Library. This sample of publications was downloaded from these sites and analyzed to produce Lexile measures, which were statistically summarized for this paper.

Similarly, various materials were examined representing different aspects of citizenship. These included newspapers, the U.S. District Court's *Handbook for Trial Jurors*, material about voting rights and responsibilities from the North Carolina State Board of Elections website, the Internal Revenue Services' (IRS) 2003 Form 1040 instructions, public online information about state marriage laws, and the North Carolina Department of Motor Vehicles' *Driver's Handbook*. Lexiles calculated by ICLE for eleven similar documents were also included in the analysis. These materials were also analyzed to produce descriptive statistics for this paper.

Obviously the choice of materials can have an effect on the results of these analyses. Analyzing all possible materials from the domains of interest would be an unending task. As the study was limited by time, choices had to be made. Available texts were analyzed from the MetaMetrics, Inc. and Questia databases that conformed to the grade range requirements for the study. All of the workplace materials available from the ICLE were also analyzed. Materials from the citizenship realm were chosen to represent typical sources of printed information that most people might encounter in daily life. Materials from the military reflect a variety of sources ranging from the mundane to the more technical and tactical. While these materials are not exhaustive, they were chosen because they may be representative of materials from these domains. To the extent they are not, then results should be interpreted with caution.

### **The Lexile Analyzer**

A Lexile measure is the specific number assigned to a text that describes the reading demands of the text. Software called the Lexile Analyzer is used to compute the Lexile measure. The Lexile Analyzer examines the entire text to measure sentence length and word frequency—characteristics that are highly related to overall text comprehensibility. Using the information about the text and the theory provided by the Lexile Framework for Reading (e.g., Stenner & Burdick, 1997; Wright & Linacre, 1994), the Lexile Analyzer arrives at a Lexile measure for the text.

The Lexile measure of a text is a number indicating the reading demand of the text in terms of the semantic difficulty (vocabulary) and syntactic complexity (sentence length). In general, the Lexile scale ranges from about 200L to 1700L although actual Lexile measures can be lower or higher. Additional details about the Lexile Framework for Reading and the Lexile Analyzer can be found at [www.Lexile.com](http://www.Lexile.com).

### **Application to Text Sources**

A Lexile measure is assigned to a text through a two-stage process. First, the entire text is digitized, formatted and analyzed. All electronic files are formatted according to established guidelines used with the Lexile Analyzer software. These guidelines include the removal of all incomplete sentences, chapter titles and paragraph headings; running a spell check; and re-punctuating where necessary to correspond to how the book would be read by a young child (for example, at the end of a page). The text is submitted to the Lexile Analyzer, which examines the lengths of the sentences and the frequencies of the words, and then reports a Lexile measure for the text.

The second step in the process is to review the Lexile measure for the text in terms of the actual layout of the text and the publisher's reported reading and interest levels (if provided). At this time, a Lexile code may be assigned. The Lexile measure and Lexile code of the book are added to the Lexile Titles Database and reported to the publisher and various trade book distributors (as appropriate).

Lexile measures were determined in this manner for the materials described earlier for each of the text domains. The resulting measures were assembled into a comprehensive database and a series of descriptive and inferential analyses were conducted. The results of text analyses are presented in the next section.

### **Results**

Descriptive statistics are given in Tables 1 and 2 for the text distributions representing the different domains of texts identified for the paper. For purposes of these tables, the university and community college texts have been combined into one category denoted "Education (13-14)." This will facilitate the detection of differences in text difficulty between the end of high school and the beginning of postsecondary education.

The first four central moments of the text distributions are summarized in Table 1. There is a monotonic increase in average text difficulty from high school to military, citizenship, the workplace and postsecondary education. The standard deviations indicate

about 100L of variability for each domain except for the workplace materials, which show greater diversity in part because of the much larger sample size for these materials. The skewness and kurtosis measures confirm that these distributions are not dramatically different from normal in their symmetry or peakedness.

The distributions of Lexile measures for texts in each domain are shown in Table 2. Again, for comparative purposes, the analyses focused on high school texts for 11<sup>th</sup> and 12<sup>th</sup> grades to summarize the text demand near the end of high school. Texts for the first two years of college/university were used as an indication of text demand near the beginning of postsecondary education. The text domains are arrayed in order of median text measures.

The table shows the number of texts from each domain and selected percentiles from the distributions of Lexile measures. The median Lexile measure for texts used near the end of high school (1130L) is lower than the median Lexiles for texts at the beginning of college, or for the other domains (workplace, military and citizenship). The differences range from 50 Lexiles (between the high school and the military texts) to 225 Lexiles (between the high school and the college/university texts).

Of course, there is even more variability within each text domain, with different domains overlapping in their text difficulty. Upon examination of the various percentiles associated with each distribution, it is encouraging to note that students reading at the highest difficulty levels of high school texts (e.g., the 95<sup>th</sup> percentile, 1300L) should be able to access the majority (perhaps as much as 75%) of texts in the military, citizenship and workplace domains, and nearly half the texts in the postsecondary domain. However, students reading at the level of the more typical high school texts (e.g., the median, 1130L) may be comfortable with only about a fourth of the reading materials in the military, citizenship and workplace domains, and perhaps as little as 5% of the postsecondary texts.

These contrasts indicate that there most likely exists a sizable difference in the text demand placed on students as they complete high school compared to what they will face in the postsecondary world. It indicates a considerable gap between the reading requirements of high school and those of later life.

Figure 1 expands on the summary in Table 2 to provide a picture of a continuum of text difficulty from high school textbooks to graduate school admissions tests. Undergraduate school admissions tests and graduate school admissions tests have been added to the picture. The community college texts are depicted separately from beginning university texts. The figure shows the distributional summaries of Lexile measures in each text collection. The text collections are arranged in increasing order of their medians.

Figure 1 exhibits a modest 50L increase in median reading difficulty between high school textbooks as compared with the reading difficulty of undergraduate admissions tests and reading materials for the military. However there is a larger increase of 100L between the median measures for high school texts and citizenship materials. The gaps between

high school texts and workplace materials (130L), community college texts (165L), university texts (265L) and graduate admissions tests (280L) are increasingly larger. A corresponding simultaneous statistical analysis of the means for these groups of texts confirms that all text differences except for the differences with undergraduate admissions tests and military materials are indeed statistically significant. (The overall ANOVA yielded  $F(7, 1722) = 12.43, p < 0.0001$ . Dunnett's  $t$  was used for post hoc pairwise comparisons of the postsecondary domains with the high school domain of texts, with experiment-wise error rate controlled at  $\alpha = 0.05$ ).

### **Summary and Conclusions**

It was not the intent of this paper to undertake a comprehensive review of all of the literature about student performance during and after the public school years. That literature is enormous and has accumulated for decades. The public discussion in this area has been protracted, often characterized by pejorative conclusions regarding the effectiveness of the public schools and thus also has frequently been riddled with disagreement. It is unlikely (and is probably not possible) that a short paper could begin to unravel the many differences that exist. They run the gamut, spanning issues of conceptualization, data collection, research methodology, data analysis procedures, methods of reporting, and ultimately, interpretation.

As will be explained below, it is currently impossible to construct valid comparisons of actual measured student performance that can be compared across the same domains used with the text measures produced for this report. Consequently, this paper merely summarizes from existing literature to illustrate some of the concerns that have been raised about student readiness for postsecondary endeavors. No claim is made as to the accuracy or generalizability of those reported results. The interested reader is directed to the original sources for fuller explanation.

### **Lack of a Commonly Used Metric for Reading Ability**

In spite of the fact that the Lexile Framework for Reading is the most widely used metric for reading ability, it is still far from universally used. Additionally, it has been used most frequently to assist teachers in matching readers with text. It has been used hardly at all to facilitate comparisons of reading ability. In fact, it is still the case that there is no systematic national assessment in the United States that would yield scores to address the comparisons of interest in this paper. While there are numerous testing programs in the public schools, and some even use tests that have been linked to the Lexile scale, the assessments are unique to each state and generally not comparable from one state to another. Different states test in different grades, at different times of year, in different subjects, etc. The National Assessment of Educational Progress (NAEP) provides results for reading in grades four, eight and twelve at the national level, but NAEP has not been linked to the Lexile scale.

The United States military uses the Armed Services Vocational Aptitude Battery (ASVAB) to determine eligibility for enlistment and for assignment to specific military jobs. There have been studies in which the ASVAB was administered to a national sample of young men and women to establish norms. However, the ASVAB has not

been linked to the Lexile scale and is not comparable to other tests used in the public schools.

The national assessments that have been conducted of adults in the workplace or in their roles as citizens have been infrequent. They have been designed as adult literacy studies, and initiated as surveys that included literacy tasks. However, the measures were unique to the studies and their scales have not been linked to measures commonly used in the public schools or the colleges and universities.

### **Effects on Comparability of Previously Reported Results**

The effect of not having a commonly used metric for reading ability is that reported results are by and large not comparable from one study to the next. The constructs vary and the metrics differ. Consequently, it is not uncommon (as we have seen) for writers to use proxy measures for student readiness that have little or no direct relation to reading ability. Consequently, attempts to interpret the literature on reading ability and postsecondary readiness should be undertaken with some reluctance and with great caution. Still, people do attempt to interpret the results and frequently have derived alarming messages as shown in the literature review.

Because there is no universally used common metric(s) for reading ability, it is impossible to construct tables for actual measured reading ability analogous to the tables for text demands that were presented in the previous section. This suggests a vast information need in the field that might be addressed by various policy actions and research initiatives, some of which are suggested later.

### **As for Text Difficulty**

It is fairly clear that a gap exists between the text demand placed on students by high school textbooks and the text demands of reading materials likely to be encountered in various postsecondary endeavors typically considered by students. The median text demand is fairly similar for the citizenship and workplace domains (1230L and 1260L, respectively). It is lower for the military (1180L); but it is significantly higher for postsecondary education (1355L). Whether a student aspires to postsecondary education, a job, the military, or just to be an informed citizen, the reading ability required is likely to be higher than what is typically required in high school (1130L) based on texts that are widely used in this country.

Furthermore, there is a remarkably systematic continuum of increasing text demand that extends from high school texts to university texts. There are significant increases in text demand from high school texts to citizenship materials, workplace materials, community college texts and university texts. The overall gap between high school textbooks and university texts is 265L. This is an enormous difference with practical implications! There are two justifications for this claim.

First, consider the fact that 250L is the difference between 75% comprehension and 50% comprehension of text. This means that a graduating high school student who is confidently reading (with 75% comprehension) at the median level of eleventh- and



twelfth-grade high school texts may enter the university three months later where the median text difficulty results in less than 50% comprehension for the student.

Second, from perhaps a more familiar perspective, this 265L difference would likely exceed one standard deviation of student scores on most standardized tests. Such a difference is very large by almost any educational standard.

It is possible that students supplement their high school academic experiences with ancillary reading material that is systematically higher in its reading demand than is the case for the textbooks typically used. In this study, there was no way to investigate the breadth of reading material actually used by high school students. To the extent that teachers assign or students elect to read more difficult texts than those typically required textbooks examined in this study, then the effective size of the text gap may be over-estimated in this report.

On the other hand, university texts were chosen from the humanities and social science disciplines. Texts from the physical sciences, mathematics, engineering, etc. were not represented. To the extent that such texts might require a higher level of reading ability, this paper's quantification of the gap could be an underestimate.

In fact, it is impossible to know exactly what the text gap between high school texts and college/university texts is without analyzing all (or a sufficiently large probability sample of) such texts. However, the fact that there appears to be a substantial gap in text demand between widely used high school textbooks and typical postsecondary textbooks in the humanities and social sciences is cause enough for concern to those who are interested in educational standards and better alignment between the public school curricula and postsecondary endeavors.

Similarly, it is quite possible that reading ability continues to improve well beyond the transition between high school and entry into postsecondary endeavors. This would be reasonable given existing evidence that we continue to grow in verbal ability into adulthood. If that is the case, then the reading ability gap that many authors infer may actually be underestimated. Again, this study could not investigate these possibilities, and existing studies of student performance do not adequately address the issue.

The existing literature on postsecondary readiness and reading ability is filled with concerns about the apparent gap between actual measured student reading ability and the reading requirements of later life. Concluding that there is such a gap and knowing its magnitude is problematic because different studies have used different constructs and metrics to investigate the effect. Yet the uniformity of conclusions that there is a problem is striking, and the calls for higher standards and better alignment between the public schools and other sectors has received more attention in recent times.

Taking the next steps will be difficult until something is done to better quantify the reading ability gap. Knowing the magnitude of the gap is only useful if one can also act sensibly on the information. In order for the information to be practicable, it must be

expressed in a metric that has universal meaning both in terms of its quantification and in terms of its relation to instructional actions—that is, it must be possible to say how much of what intervention is needed to bridge the gap.

This is a signal advantage of the Lexile Framework for Reading. The fact that both readers and text can be quantified on the same scale makes it possible to match readers with texts that are appropriately targeted to their reading ability. Thus it is also possible to challenge readers enough to stimulate their improvement without inadvertently discouraging them by suddenly increasing the demand beyond their immediate capabilities.

To more definitively identify and quantify the gap between the reading ability of students when they are in high school and their reading ability once they leave high school and engage in various endeavors would require a more systematic study that follows specific students for several years, measures their reading ability on repeated occasions and also documents and measures the texts that they encounter in each context. This in turn would presume the ability to measure both reading ability and text difficulty on the same scale. Such a study would take several years and would likely be expensive.

Such a study would have several advantages over extant investigations however. It would overcome objections to differences in construct and metric. It would eliminate cohort differences as one possible explanation for observed differences in ability. It could also more faithfully represent the actual life courses chosen and events experienced by a nationally representative group of students. In this respect, it would have higher ecological validity than many studies that now claim to estimate the gap between reading ability and postsecondary reading requirements.

Other possible strategies might be mounted on existing assessments and studies periodically conducted by the federal government. For example, if the reading tests for NAEP were linked to a universal metric for both reading ability and text difficulty, then the generalizability of NAEP results would be greatly enhanced and the policy implications of NAEP findings would gain new value in terms of actionability. For example, if the NAEP reading tests were linked with the Lexile Framework for Reading, at least five significant benefits would accrue:

1. The NAEP tests could be located on the continuum of text difficulty;
2. Readers could be located on the same scale;
3. NAEP proficiency level descriptions could be annotated with texts that readers at different levels can read with success;
4. It would be possible to produce an implied comprehension rate for any reading proficiency scale result; and
5. New meaning would be imparted to previously reported results.

Not only could NAEP results become directly comparable with a variety of widely used national measures that are also linked to the Lexile Framework, but states that participate

in NAEP could conceivably examine their textbook choices and their reading program initiatives more directly in light of the NAEP results for the state.

Similarly benefits could accrue if the measures used in other national studies were linked to the Lexile Framework for Reading. Consider the rich new information available if the National Assessments of Adult Literacy (NAAL), the National Longitudinal Study (NLS), High School and Beyond (HS&B), the National Education Longitudinal Study (NELS), the Armed Services Vocational Aptitude Battery (ASVAB) and other similar efforts were also linked. The results of each of these studies could suddenly have a basis for comparability; they could also be comparable to measures from linked nationally normed tests used in different states. Findings from all of these sources would suddenly have direct commonly understood instructional meaning in terms of the text demand implied for readers.

A by-product of this strategy might be that educational standards would have a basis for comparability across the nation, a situation that does not now exist. If that were achieved, then policy discussions and actions related to educational standards and accountability would be greatly facilitated. The ultimate benefactors would be the students and all who rely on them for the future of the country.

## Bibliography

- Achieve, Inc. (2004). *Do Graduation Tests Measure Up? A Closer Look at State High School Exit Exams*. Washington, DC: Achieve, Inc.
- Bock, R. D., & Moore, E. G. J. (1986). *Advantage and Disadvantage: A Profile of American Youth*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Carroll, C. D. (1988). Enrollment in postsecondary education of 1980 and 1982 high school graduates. Washington, DC: NCES.
- Carroll, C. D. (1989). College persistence and degree attainment for 1980 high school graduates: Hazards for transfers, stopouts and part-timers. Washington, DC: NCES.
- Greene, J. P. (2000). The cost of remedial education: How much Michigan pays when students fail to learn basic skills. Midland, MI: Mackinac Center for Public Policy.
- Greene, J. P., & Forster, G. (2003). Public high school graduation and college readiness rates in the United States. Education Working Paper, No. 3. Center for Civic Innovation at The Manhattan Institute.
- Hogan, D. W., Jr. (2000). *225 years of service: The U.S. Army, 1775-2000*. Washington, DC: Center of Military History, U.S. Army.
- Horn, L. J. (1998). Confronting the odds: Students at risk and the pipeline to higher education. Washington, DC: NCES.
- Kaestle, C. F., Campbell, A., Finn, J. D., Johnson, S. T., & Mickulecky, L. J. (2001). *Adult Literacy and Education in America*. Washington, DC: NCES.
- Kirsh, I. S., Jungeblut, A., Jenkins, L., & Kolstad, A. (1993). *Adult Literacy in America: A First Look at the Findings of the National Adult Literacy Survey*. Washington, DC: NCES.
- Knepper, P. (1990). Trends in postsecondary credit production: 1972 and 1980 high school graduates. Washington, DC: NCES.
- National Assessment Governing Board. (2004). *12<sup>th</sup> Grade Student Achievement in America: A New Vision for NAEP*. A Report to the National Assessment Governing Board by the National Commission on NAEP 12<sup>th</sup> Grade Assessment and Reporting. Washington, DC: National Assessment Governing Board. Available at: [http://www.nagb.org/release/12\\_gr\\_commission\\_rpt.pdf](http://www.nagb.org/release/12_gr_commission_rpt.pdf).
- Parker, R. (2004, May 1). Researcher: Graduates need the skills to compete in global marketplace. *Naples Daily News*. Available at: [http://www1.naplesnews.com/npdn/news/article/0,2071,NPDN\\_14940\\_2851188,00.html](http://www1.naplesnews.com/npdn/news/article/0,2071,NPDN_14940_2851188,00.html)
- Pennsylvania Department of Education. (2004). Pennsylvania reading requirements for school, the workplace and society: Executive summary of findings. [Online]. Available: [http://www.pde.beta.state.pa.us/career\\_edu/lib/career\\_edu/pennsylvania\\_reading\\_requirements\\_for\\_school\\_summary\\_reporà.pdf](http://www.pde.beta.state.pa.us/career_edu/lib/career_edu/pennsylvania_reading_requirements_for_school_summary_reporà.pdf).
- Rosenbaum, J. E. (2004). It's time to tell the kids: If you don't do well in high school, you won't do well in college (or on the job). *American Educator, Spring*. [Online]. Available: [http://www.aft.org/american\\_educator/spring2004/tellthekids.html](http://www.aft.org/american_educator/spring2004/tellthekids.html).

- Sanderson, A., Dugoni, B., Rasinski, K., Taylor, J., & Carroll, C. D.. (1996). *NELS:88/94 Descriptive Summary Report With An Essay On "Access And Choice In Postsecondary Education."* Washington, DC: NCES.
- Stenner, A. J. (2003). Matching students to text: The targeted reader. A Scholastic Professional Paper. New York: Scholastic, Inc. Available at: [http://www.tomsnyder.com/reports/Target\\_Reader\\_Web2.pdf](http://www.tomsnyder.com/reports/Target_Reader_Web2.pdf).
- Stenner, A. J., & Burdick, D. (1997). The objective measurement of reading comprehension—In response to technical questions raised by the California Department of Education Technical Study Group. Durham, NC: MetaMetrics, Inc.
- Sum, A. (1999). *Literacy in the Labor Force: Results from the National Adult Literacy Survey*. Washington, DC: NCES.
- U.S. Department of Defense. (1982). *Profile of American Youth: 1980 Nationwide Administration of the ASVAB*. Washington, DC: U.S. Department of Defense.
- U.S. Department of Defense. (1998). *Population Representation in the Military Services*. Washington, DC: Office of the Assistant Secretary of Defense, U.S. Department of Defense. Executive Summary available at: <http://www.defenselink.mil/prhome/poprep97/index.html>.
- U.S. Department of Education. Institute of Education Sciences. National Center for Education Statistics. (2003a). *The Nation's Report Card: Reading 2002*, NCES 2003-521, by W. S. Grigg, M. C. Daane, Y. Jin, & J. R. Campbell. Washington, DC: NCES.
- U.S. Department of Education. Institute of Education Sciences. National Center for Education Statistics. (2003b). *The Nation's Report Card: Reading Highlights 2003*. NCES 2004-452. Washington, DC: NCES. Available online at: <http://nces.ed.gov/nationsreportcard/pdf/main2003/2004452.pdf>.
- U.S. Department of Education, National Center for Education Statistics. (2003). *Remedial Education at Degree-Granting Postsecondary Institutions in Fall 2000*, NCES 2004-010, by Basmat Parsad and Laurie Lewis. Project Officer: Bernard Greene. Washington, DC: NCES.
- U.S. Department of Education, National Center for Education Statistics. (1999). *Credit Production and Progress Toward the Bachelor's Degree: An Analysis of Postsecondary Transcripts for Beginning Students at 4-Year Institutions*, NCES 1999-179, by Alexander C. McCormick. Project Officer: Dennis Carroll. Washington DC: NCES.
- U.S. Department of Labor. (1991). *What work requires of schools: A SCANS report for America 2000*. Washington, DC: The Secretary's Commission On Achieving Necessary Skills (SCANS). Available at: <http://wdr.doleta.gov/SCANS/whatwork/whatwork.pdf>
- Venezia, A., Kirst, M. W., & Antonio, A. L. (2003). Betraying the college dream: How disconnected K-12 and postsecondary education systems undermine student aspirations. Stanford, CA: The Stanford Institute for Higher Education Research.
- Waters, B. K., Barnes, J. D., Foley, P., Steinhaus, S. D., & Brown, D. C. (1988). *Estimating the Reading Skills of Military Applicants: The Development of an ASVAB to RGL Conversion Table*. Alexandria, VA: Human Resources Research Organization.

Wright, B. D., & Linacre, J. M. (1994). *The Rasch model as a foundation for the Lexile Framework*. Durham, NC: MetaMetrics, Inc.

## ***Tables and Figures***

**Table 1****Text Difficulty in Lexiles for Different Text Collections  
Descriptive Statistics**

Text Collection	N	Mean	SD	Skewness	Kurtosis
Education (13-14)	150	1352	149	-0.08	0.35
Workplace	1401	1248	213	0.07	0.83
Citizenship	54	1240	92	-0.02	-0.11
Military	22	1186	118	0.67	0.31
Education (11-12)	75	1123	116	-0.46	0.73

**Table 2****Text Difficulty in Lexiles for Different Text Collections  
Selected Percentiles**

Text Collection	N	Lexile Measures Percentiles				
		5 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	95 <sup>th</sup>
Education (13-14)	150	1124	1253	1355	1450	1580
Workplace	1401	900	1120	1260	1360	1590
Citizenship	54	1090	1193	1230	1305	1384
Military	22	1013	1105	1180	1235	1388
Education (11-12)	75	880	1070	1130	1180	1300



**Figure 1**

**A Continuum of Text Difficulty for the Transition from High School to Postsecondary Experiences**

(Box Plot Percentiles: 5th, 25th, 50th, 75th, 95th)

