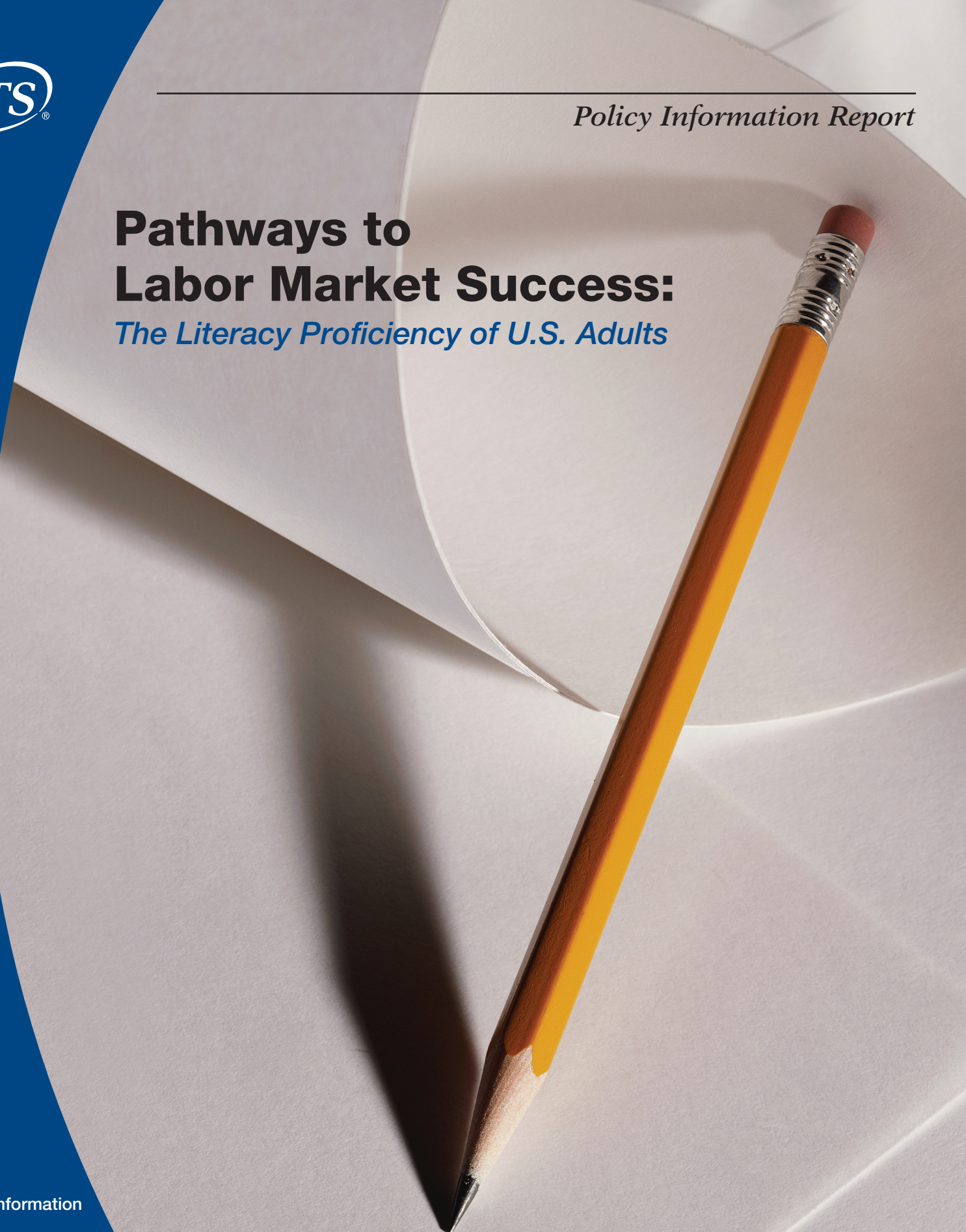
Policy Information Report

Pathways to Labor Market Success:

The Literacy Proficiency of U.S. Adults



Policy Information Center

Policy Evaluation and Research Center

Center for Global Assessment

This report was written by:

Andrew Sum
Center for Labor Market Studies
Northeastern University

Irwin Kirsch
Center for Global Assessment
Educational Testing Service

Kentaro Yamamoto
Center for Global Assessment
Educational Testing Service

Additional copies of this report can be ordered for $15 (prepaid) from:

Policy Information Center
Mail Stop 19-R
Educational Testing Service
Rosedale Road
Princeton, NJ 08541-0001
(609) 734-5949
pic@ets.org

Copies can be downloaded from www.ets.org/research/pic

October 2004

Center for Global Assessment
Research and Development
Policy Information Center
Policy Evaluation and
Research Center
Educational Testing Service

Preface

This is the fourth in a series of reports that draws upon the vast amount of background and assessment data and information that have been collected from the National Adult Literacy Survey (NALS) and the International Adult Literacy Survey (IALS).* In this report Andrew Sum, Irwin Kirsch, and Kentaro Yamamoto find connections between the literacy skills of adults and their success in the labor market during the 1990s. In addition to describing the population's prose, document, and quantitative proficiencies, the authors report on the relationship of these adults' skills to their socioeconomic characteristics, labor force activity and experience, weekly wages and annual earnings, and their recent education and training activities. Sum, Kirsch, and Yamamoto also compare the literacy of the U.S. labor force with the literacy of workers in other countries, and they examine the influence of that proficiency on an array of labor market outcomes and behaviors.

Sum, Kirsch, and Yamamoto's analyses reveal large differences in the literacy skills of U.S. workers in various occupations and demographic groups. They attribute important differences in earnings and other labor market outcomes and behaviors to these literacy gaps. The data show that workers with higher levels of literacy were more likely to participate in education and training, which the authors believe contributes to the growing gap between the "haves" and "have-nots." Particularly disturbing is the finding that many workers with limited literacy skills are not aware of that limitation, decreasing the likelihood that they will seek help. Sum, Kirsch, and Yamamoto offer suggestions for addressing the problem and remind us that strengthening the literacy skills of U.S. workers is necessary for achieving equality among groups and for realizing the nation's potential for economic growth.

Michael T. Nettles
Vice-President
Policy Evaluation and Research Center

* Andrew Sum, Irwin Kirsch, and Robert Taggart, *The Twin Challenges of Mediocrity and Inequality: Literacy in the U.S. from an International Perspective*, February 2002; Andrew Sum, Irwin Kirsch, and Kentaro Yamamoto, *A Human Capital Concern: The Literacy Proficiency of U.S. Immigrants*, March 2004; and Rima Rudd, Irwin Kirsch, and Kentaro Yamamoto, *Literacy and Health in America*, April 2004.

Acknowledgments

The authors acknowledge the thoughtful feedback and suggestions on the report made by Richard Coley and Donna Desrochers, Educational Testing Service; Scott Murray, Statistics Canada; and Johan E. Uvin, Vice President for Research and Evaluation, Commonwealth Corporation. Thanks are owed to Mykhaylo Trubs'kyy and Ishwar Khatiwada of the Center for Labor Market Studies, Northeastern University, and Minhwei Wang of Educational Testing Service for their research assistance. Also, thanks are owed to Sheila Palma of the Center for Labor Market Studies for her help on word processing and graphics for this report. Lynn Jenkins and Linda Scatton provided editorial services, Loretta Casalaina and Susan Mills provided desk-top publishing services, and Joe Kolodey designed the cover. Errors of fact or interpretation are those of the authors.

Economic, demographic, and technological forces have combined over the past two decades to dramatically change the employment landscape and the earnings structure in the United States. Not only has the industrial and occupational composition of employment been transformed, but skill and literacy requirements within many occupations also have changed. While high-wage opportunities for those with no postsecondary education and limited literacy and numeracy skills have been significantly curtailed, individuals who possess college degrees and advanced skills have enjoyed an expansion of job and high-wage opportunities.

This report probes the connections between adults' literacy skills and their success in the labor market during the 1990s based on data from two national assessments conducted in the United States: The 1992 National Adult Literacy Survey (NALS) and the 1994 International Adult Literacy Survey (IALS). Both surveys assessed the literacy proficiencies of a representative cross-section of U.S. adults (age16 and older) using an array of literacy tasks which varied in terms of materials, content, and task requirements, and thus in terms of difficulty. The NALS and IALS surveys also included an array of background questions which captured information on respondents' demographic and socioeconomic characteristics, their labor force behavior at the time of the assessment, their labor market experiences in the prior year, their weekly wages and annual earnings, and other information on their recent educational and training activities.

The performance results from the NALS and IALS surveys are reported on three proficiency scales—*prose, document*, and *quantitative*, corresponding to the three areas of literacy assessed—and on a *composite* proficiency scale. Each scale ranges in value from 0 to 500. Performance is categorized into five levels of literacy proficiency, with Level 1 representing the most limited skills and Level 5 representing the most advanced.

Drawing on the rich data provided by NALS and IALS, this report investigates the links between literacy proficiencies and labor market outcomes among various demographic and socioeconomic groups within the U.S. during the 1990s. The report also compares the literacy proficiencies of the labor force in the United States with those of other nations, identifies differences in the distribution of literacy proficiencies among the employed in different countries, and examines the influence of these proficiencies on an array of labor market outcomes and behaviors. A summary of the report's key findings and their policy implications is presented below.

Key Findings

Literacy and Labor Force Activity

- U.S. adults with higher levels of literacy proficiency were more likely to be active labor force participants, to avoid unemployment when they did seek work, and thus, more likely to be employed than their peers with more limited proficiencies. The mean literacy scores of the employed were substantially higher than scores of adults who were unemployed or not active in the labor force.
- U.S. adults with limited literacy skills, as well as those with moderate to strong literacy skills, were more likely to be employed than their counterparts in most other high-income countries.
- Employed adults in the United States had slightly higher literacy scores, on average, than their counterparts in all other high-income countries combined. However, the composite proficiencies of unemployed adults in the United States, and of adults who were not active in the labor force, were very similar to those of their international counterparts.
- When ranked with other high-income countries, the literacy skills of both the employed and the full-time employed in the United States were in the middle of the pack with respect to prose literacy, but in the bottom third of the distribution with respect to document and quantitative literacy.

- The proficiency gaps between U.S. workers at the top of the skills distribution and those at the bottom were consistently larger than the gaps found in other high-income countries. In fact, inequality in the distribution of literacy skills among the employed in the United States was among the largest of all the high-income countries examined.

Literacy, Occupational Attachment, and Job Responsibilities

- There were very large disparities in mean literacy proficiencies of workers across occupations. U.S. workers in professional, management-related, and technical occupations scored the highest on each of the literacy scales, substantially outperforming workers employed in service, craft, production/fabricator, and laborer/helper occupations.
- While professional, technical, and managerial workers in the United States tended to have stronger literacy proficiencies than their occupational counterparts in other high-income countries, the mean proficiencies of service and blue collar workers in this country typically fell in the bottom third of the literacy rankings for such workers among other high-income countries.
- Workers with higher levels of literacy proficiency were far more likely than their counterparts with limited skills to report having some supervisory responsibilities on their job.

Literacy and Earnings

- On each of the literacy scales, the mean weekly earnings of the full-time employed in the United States rose steadily and strongly across the proficiency levels. Full-time employees who scored in Level 5 earned between two and three times as much, on average, as those in Level 1.
- Annual earnings also were strongly associated with literacy skills. The mean annual earnings of the employed with a Level 5 proficiency were typically three times as high as those of workers who scored in Level 1.
- These strong positive links between literacy and earnings existed for men and women, Whites, Blacks, and Hispanics, nearly all age groups, and educational attainment groups.

Literacy and Poverty

- The likelihood of U.S. adults being poor or near poor at the time of the NALS survey was closely linked to their literacy proficiencies. This relationship held true for the native born as well as for immigrants.
- U.S. adults with limited literacy skills were more likely than those with advanced skills to rely on public cash and in-kind transfers to support themselves. In fact, adults scoring in Level 1 on the prose or quantitative scale were typically four times more likely to be receiving such cash and in-kind transfers than their counterparts in Level 4 or 5.

Literacy and Participation in Education and Training Activities

- U.S. workers with stronger literacy proficiencies were much more likely to have participated in education or training activities in the year prior to the assessment than those with limited skills. Further, among those enrolled in an education or training activity, individuals with stronger literacy proficiencies were more likely to have enrolled in multiple courses.
- Workers whose job duties involved more reading, writing, and math-related tasks were considerably more likely to have received education or training from their employers.
- A substantial majority of workers in the United States, including those in Levels 1 and 2, believe that their existing reading, writing, and arithmetic skills on their current jobs are good or excellent. Except for those in Level 1, relatively few workers believe that their existing proficiencies will limit their future job opportunities.

Implications

These analyses reveal substantial disparities in literacy skills among workers in various occupations and other demographic/socioeconomic groups within the U.S. labor force. Furthermore, workers with higher levels of literacy proficiency were more likely to receive education and training than those with more limited skills—thus further expanding the human capital gaps over the worklife. These considerable differences in literacy skills, in turn, lead to very large gaps in earnings. Together, these findings indicate that the skilled are getting more skilled, and becoming richer in the process, while the less skilled are falling further behind.

Targeted efforts to strengthen the literacy proficiencies of the nation's workers, including new immigrants, will be required to reduce these disparities and expand future opportunities for all members of the U.S. labor force. To strengthen the literacy skills of the U.S. labor force, a broad-based effort will be necessary. In particular, existing workplace education and training efforts must be expanded and improved. More front-line workers need to be involved in these programs, and connections between occupational/technical training and literacy training must be strengthened. Greater accountability for results will also be essential. To date, there have been few systematic efforts to gauge the long-term impacts of various literacy training programs (e.g., adult basic education programs and workplace literacy programs) on the employment and earnings of participants. Such evaluations are urgently needed.

Perhaps one of the most striking findings in this report is the dissonance between workers' existing literacy skills and their perceptions of their opportunities for future career advancement. To put it simply, many workers with limited literacy skills do not perceive that they have a problem. Until they do, it will be difficult to motivate workers to seek significant improvement in their proficiencies. Improving the literacy skills of the U.S. labor force will also depend on making workers more aware of both their current proficiencies and the levels of proficiency needed to gain entry into higher-skilled and higher-wage occupations.

In summary, literacy is vital to the economic well-being of individual workers and of nations. Strengthening literacy skills is not just important from the standpoint of equalizing opportunities for those who are struggling to succeed in the current labor market. It is also key to increasing future employment and labor productivity and expanding the nation's economic growth potential.

Introduction

Over the past two decades, U.S. labor markets and U.S. workers have been buffeted by a wide array of economic and technological forces that have substantially altered the industrial structure of jobs, their occupational composition, their geographic locations, and their economic remuneration. Shifts in the level and pattern of domestic and international demand for U.S. goods and services, the growing dependence of the nation's economy on imports of many goods, the impacts of deregulation of key industries, and differences in labor productivity growth across industries have altered the distribution of jobs by industrial sector. Many goods-producing industries, especially mining and manufacturing, have experienced absolute and relative declines in employment, while many trade, private service, and finance/real estate industries have achieved growth.[1]

These industrial employment shifts, in turn, have directly altered the demand for workers by major occupation, given large differences in occupational staffing patterns across industries. Changes in production technologies within industrial sectors, corporate downsizing and restructuring efforts, and the reorganization of work in other sectors have altered the occupational composition of employment within industries. Workers in professional, managerial, high-level sales, and service occupations gained the most from these labor market developments throughout the 1980s and 1990s, while many workers in entry-level office and most blue collar occupations, except construction-related craft workers, have lost ground.

These changes in the occupational composition of employment in the United States and changes in the skill and literacy requirements within occupations have altered the demand for workers by educational attainment, literacy and math proficiencies, and technical skills. The increased need for workers in many professional, management-related, and high-level sales positions boosted the demand for college educated workers and for workers with higher levels of literacy and math proficiencies. As the demand for well-educated and highly literate workers increased faster than the available supply, the economic returns to postsecondary education and to strong literacy/math proficiencies increased, and wage and earnings inequality among U.S. workers rose. As Eric Hanushek recently noted, "Skilled labor is becoming more and more valued in today's economy. This is reflected in the compensation that skilled workers receive. The gap between the skilled and the unskilled continues to grow."[2]

In recent years, economists and other labor market analysts have emphasized the importance of the quality of schooling as well as the quantity of schooling in determining the economic well-being of individual workers and nations. The quality of schooling can be measured in a number of different ways, including academic aptitude test scores of workers, their achievement test scores in reading, math, and science, or their general literacy proficiencies as measured by the National Assessment of Educational Progress (NAEP) Young Adult or U.S. Department of Labor literacy assessments.[3] The literacy proficiencies and academic achievement test scores of young and older adults have been found to be important predictors of their educational and labor market success. Young adults with stronger academic achievement test scores are more likely to graduate from high school, enroll in college, attend four year colleges and universities, obtain college degrees, and receive more training and education

---

1 The impacts of the changing industrial and occupational distribution of employment on the labor market fate of selected demographic and socioeconomic subgroups of workers in the United States and on the demand for workers with higher literacy proficiencies and levels of formal schooling are described in the following publications.
See: (i) Anthony Carnevale and Stephen J. Rose, *Education for What? The New Office Economy*, Educational Testing Service, Washington, D.C., 1998; (ii) Peter B. Doeringer et al. (Editors), *Turbulence in the American Workplace*, Oxford University Press, New York, 1991; (iii) John Comings, Andrew Sum, and Johan Uvin, *New Skills for a New Economy: Adult Education's Key Role in Sustaining Economic Growth and Expanding Opportunity,* The Massachusetts Institute for a New Commonwealth, Boston, 2000; (iv) Richard J. Murnane and Frank Levy, *Teaching the New Basic Skills*, The Free Press, New York, 1996; (v) Garth Mangum, Stephen Mangum, and Andrew Sum, *A Fourth Chance for the Second Chance*, Sar Levitan Center for Social Policy Studies, Johns Hopkins University, Baltimore, 1999; (vi) Ray Marshall and Marc Tucker, *Thinking for A Living*, Basic Books, New York, 1992.

2 See: Eric A. Hanushek, "The Seeds of Growth," *Education Next*, Fall 2002, pp. 10-17.

3 See: Irwin S. Kirsch and Ann Jungeblut, *Literacy Profiles of America's Young Adults*, Educational Testing Service, Princeton, New Jersey, 1986; (ii) Irwin S. Kirsch, Ann Jungeblut, and Anne Campbell, *Beyond the School Doors: The Literacy Needs of Job Seekers Served by the U.S. Department of Labor*, Educational Testing Service, Princeton, New Jersey, 1992.

in their later adult years.[4] Adults with stronger literacy proficiencies are more likely to actively participate in the labor force, avoid unemployment and underemployment problems, obtain higher weekly wages and annual earnings, and more readily gain access to high-skilled, high-growth occupations.[5]

The quantity and quality of schooling possessed by a nation's adult population also have been found to be important determinants of economic growth in many, though not all, countries across the world.[6] Higher amounts of such human capital can increase aggregate labor input, raise labor productivity, facilitate the design and adoption of new production technologies, and increase the adoption of high-performance work organizations. As Gary Becker, a former Nobel Prize winner in economics, recently argued in an overview piece on the role of human capital in the economic world today: "This is the 'Age of human capital' in the sense that human capital is by far the most important form of capital in modern economies. The economic success of individuals, and also of whole economies, depends on how extensively and effectively people invest in themselves."[7]

The National and International Adult Literacy Surveys

Despite the growing emphasis on literacy and math proficiencies as important determinants of educational, labor market, and social outcomes, the vast majority of the available surveys and data sets on the academic achievement and literacy proficiencies of persons in our nation are based on elementary and high school students and longitudinal surveys of young adults, including the 1979 National Longitudinal Survey of Youth (NLSY) and the 1980 and 1982 High School and Beyond Surveys. In the 1990s, however, two national assessments of the literacy proficiencies of a representative cross-section of U.S. adults age 16 and older—the National Adult Literacy Survey (NALS) and the International Adult Literacy Survey (IALS)—added substantially to this body of information.

NALS, conducted in 1992 by the Educational Testing Service (ETS) for the U.S. Department of Education, was the largest and most comprehensive assessment of the literacy proficiencies of the nation's entire adult population (age 16 and older) ever undertaken.[8]

---

4 See: (i) Andrew Sum, *Literacy in the Labor Force*, National Center for Education Statistics, Washington, D.C., 1999; (ii) Gordon Berlin and Andrew Sum, *Toward A More Perfect Union: Basic Skills, Poor Families, and American's Future,* Ford Foundation, New York, 1988.

5 For a review of empirical findings on the links between academic proficiencies and labor market success for a wide array of worker groups, see: (i) Gordon Berlin and Andrew Sum, *Toward A More Perfect Union;* (ii) Sue Berryman, *The Role of Literacy in the Wealth of Individuals and Nations*, National Center on Adult Literacy, University of Pennsylvania, Philadelphia, 1994*;* (iii) William R. Johnson and Derek Neal, "Basic Skills and the Black-White Earnings Gap," in *The Black-White Test Score Gap*, Brookings Institution Press, Washington, D.C., 1998; (iv) Francisco L. Rivera-Batiz, "Quantitative Literacy and the Likelihood of Employment Among Young Adults", *Journal of Human Resources,* Vol. 27, No. 2, pp. 313-328; (v) Andrew Sum, *Literacy in the Labor Force,* 1999; (vi) Andrew Sum, Neeta Fogg, and Garth Mangum, *Confronting the Youth Demographic Challenge*, Sar Levitan Center for Social Policy Studies, Johns Hopkins University, Baltimore, 2000; (vii) John Tyler, Richard Murnane, and John Willett, *Do the Cognitive Skills of School Dropouts Matter in the Labor Market*?, NCSALL Report, Washington, D.C., April 2000; (viii) Christopher Winship and Anders D. Korneman, "Economic Success and the Evolution of Schooling and Mental Ability," in *Earning and Learning: How Schools Matter* (Editors: Susan Mayer and Paul Peterson), Brookings Institution Press, Washington, D.C., 1999, pp. 49-78. Empirical findings on the links between the literacy proficiencies and formal schooling of adults and their earnings in the IALS countries can be found in: Organisation for Economic Cooperation and Development and Statistics Canada, *Literacy in the Information Age: Final Report of the International Adult Literacy Survey*, Ottawa, 2000.

6 For a review of employment trends in other OECD nations and their human capital implications, see: (i) OECD and Statistics Canada, *Literacy in the Information Age*, 2000; (ii) Statistics Canada, *Reading the Future: A Portrait of Literacy in Canada,* Ottawa, 1997; (iii) Eric A. Hanushek, "The Seeds of Growth," pp. 10-17; (iv) Eric A. Hanushek, "The Importance of School Quality," in *Our Schools and Our Future*, (Editor: Paul E. Peterson), Hoover Institution Press, Stanford University, Stanford, 2003; pp. 141-176. A critique of the effectiveness of educational investments in promoting economic growth in many developing nations across the world has been provided by William Easterly. See: (i) William Easterly, "Barren Land," *Education Next*, Fall 2001, pp. 18-23; (ii) William Easterly, *The Elusive Quest for Growth: An Economist's Adventures and Misadventures in the Tropics*, MIT Press, Cambridge, Massachusetts, 2002.

7 See: Gary Becker, "The Age of Human Capital," in *Education in the Twenty-First Century* (Editor: Edward P. Lazear), Hoover Institution Press, Stanford, California, 2002, pp. 3-8.

8 For a review of the purposes, design features, and findings of the National Adult Literacy Survey (NALS) that was conducted in 1992 by the Educational Testing Service for the U.S. Department of Education, see: (i) Irwin S. Kirsch et al., *Adult Literacy in America*, 1993*;* (ii) Karl O. Haigler, Caroline Harlow, Patricia O'Connor, and Anne Campbell, *Literacy Behind Prison Walls: Profiles of the Prison Population from the National Adult Literacy Survey*, National Center for Education Statistics, U.S. Department of Education, Washington, D.C., 1994; (iii) Andrew Sum, *Literacy in the Labor Force*, 1999.

Many of the literacy concepts and measures underlying the NALS assessment were originally developed by ETS in two earlier assessments of the nation's young adult population (21-25 years old) and of unemployed and economically disadvantaged adults served by unemployment insurance and employment and training programs funded by the U.S. Department of Labor.[9] The NALS assessment provided information on the literacy proficiencies of a sample of 26,091 adults age 16 and older, including a sample of 1,147 adults in federal and state prisons as well as supplemental samples from 12 states yielding state representative samples.[10] In addition to assessing participants' literacy skills, the NALS gathered extensive background information on their demographic and socioeconomic characteristics (e.g., age, gender, nativity status, schooling), their labor force status, the industries and occupations of their jobs, weekly earnings, annual earnings, household incomes, as well as their literacy practices.

Following upon the NALS, a pioneering effort was undertaken to develop and conduct the first-ever comparative, international assessment of adult literacy. This assessment effort became known as the International Adult Literacy Survey (IALS) and involved the joint efforts of participating national governments, their statistical agencies and research bureaus, the Organisation for Economic Co-operation and Development (OECD) and the technical support of Statistics Canada, Educational Testing Service, and the National Center for Education Statistics in the U.S. Department of Education.[11] As with the NALS, a comprehensive background questionnaire in the IALS assessment captured information on respondents' demographic and socioeconomic characteristics and their labor market experiences in the past year.

The availability of the IALS data for other countries enables us to compare the literacy proficiencies of the labor force and the employed in the United States with those of other nations, to identify differences in the distribution of literacy proficiencies of the employed across countries, and to determine the influence of these proficiencies on an array of labor market outcomes and behaviors across these same countries.

These international assessments took place in three stages, beginning in 1994 and continuing through 1998. A total of 23 nations took part in the IALS project. Most were in North America and Western Europe, but other nations included Australia, several Eastern European countries (the Czech Republic, Hungary, Slovenia, Poland), New Zealand and Chile. In Canada and Switzerland, multiple language versions of the assessment were administered. In the United States, all of the literacy assessments were in English.

Defining and Measuring Literacy

The original participating countries in the IALS survey agreed to adopt the definition and framework for measuring literacy that was used in conducting the NALS assessment. Literacy was defined as:

> *Using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential.*

Both the NALS and IALS assessments measured respondents' proficiencies along three literacy scales: prose, document, and quantitative. Each scale was constructed to yield scores that would range from 0 to 500. A brief description of the tasks and skills underlying each of the three literacy scales follows.

---

9 See: (i) Irwin S. Kirsch and Ann Jungeblut, *Literacy Profiles of America's Young Adults*, 1986; (ii) Richard L. Venezky, Carl F. Kaestle, and Andrew M. Sum, *The Subtle Danger;* (iii) Irwin S. Kirsch, Ann Jungeblut and Anne Campbell, *Beyond the School Doors: The Literacy Needs of Job Seekers Served by the U.S. Department of Labor,* 1997.

10 For further information on the sample size and design of the NALS survey, see: Irwin S. Kirsch et al., *Adult Literacy in America*, 1993, pp. 5-7.

11 For a review of the purposes, design features, sample design, timing, and findings of the International Adult Literacy Survey, see: (i) OECD and Statistics Canada, *Literacy, Economy, and Society;* (ii) OECD and Statistics Canada, *Literacy in the Information Age*, 2000. Key findings of the Canadian survey are presented in: Statistics Canada, *Reading the Future: A Portrait of Literacy in Canada*.For another comparison of the literacy proficiency of Americans with that of other populations, see: Albert Tuijnman, *Benchmarking Adult Literacy in America: An International Comparative Study*, Division of Adult Education and Literacy, Office of Vocational and Adult Education, U.S. Department of Education, September 2000.

Prose literacy – the knowledge and skills needed to understand and use information from texts that include editorials, news stories, poems, and fiction. For example, finding a piece of information in a newspaper article, interpreting instructions from a warranty, inferring a theme from a poem, or contrasting views expressed in an editorial.

Document literacy – the knowledge and skills required to locate and use information contained in materials that include job applications, payroll forms, transportation schedules, maps, tables, and graphs. For example, locating a particular intersection on a street map, using a schedule to choose the appropriate bus, or entering information on an application form.

Quantitative literacy – the knowledge and skills required to apply arithmetic operations, either alone or sequentially, using numbers embedded in printed materials. For example, balancing a checkbook, figuring out a tip, completing an order form, or determining the amount of interest from a loan advertisement.

The estimated proficiencies of respondents on the three literacy scales were combined to produce a fourth estimate of literacy—a composite proficiency scale. A simple arithmetic average of the estimated prose, document, and quantitative scores was used to represent the composite proficiency score of each respondent.

The literacy tasks administered in the NALS and IALS surveys varied widely in terms of materials, content, and task requirements, and thus in terms of difficulty. The range of difficulty for these tasks is captured in Figure 1, which describes some of the NALS literacy tasks on each of the three scales and indicates their scale values. Even a cursory review of this display reveals that tasks at the lower end of each scale differ substantially from ones at the high end. A careful analysis of the range of tasks along each scale reveals an ordered set of information-processing skills and strategies. On the prose scale, for example, tasks with low scale scores ask readers to locate or identify information in brief, familiar, or uncomplicated materials, while those at the high end ask them to perform more demanding activities using materials that tend to be lengthy, unfamiliar, or complex. Similarly, on the document and quantitative scales, the tasks at the low end of the scale differ from those at the high end in terms of the structure of the material, the content and context of the material, and the nature of the directive.

In an attempt to capture this progression of information-processing skills and strategies, each scale was divided into five levels:

Level	*Score range*
Level 1	0 to 225
Level 2	226 to 275
Level 3	276 to 325
Level 4	326 to 375
Level 5	376 to 500

The points and score ranges that separate the levels on each scale reflect fundamental differences in the literacy skills and strategies required to successfully complete increasingly complex tasks. Analyses of the types of materials and demands that characterize each level reveal the progression of literacy demands along each scale.

Many of the analyses of the labor force behavior, employment experiences, weekly and annual earnings, job characteristics, and education and training activities of U.S. adults in this monograph are based on findings by proficiency level on the four literacy scales (prose, document, quantitative and composite). It should be noted that the distribution of all U.S. adults age 16 and older and those age 16 to 65 is not uniform across these five levels. For example, NALS findings revealed that 21% of the adults had a Level 1 prose proficiency, 27% had a Level 2 proficiency, 32% had a Level 3 proficiency, 17 percent had a Level 4 proficiency, and only 3% had a Level 5 proficiency.[12] On each of the four literacy scales, only a small fraction of U.S. adults (3 to 4%) achieved a Level 5 proficiency. The proportion of U.S. adults attaining the highest proficiency level did, however, vary considerably by their educational attainment, with bachelor's degree recipients and those with advanced degrees being most likely to achieve Level 5 on each scale.

[12] See: Irwin Kirsch, et al., *Adult Literacy in America*, 1993, p. 17.

Figure 1:

Difficulty Values of Selected Tasks Along the Prose, Document, and Quantitative Literacy Scales

Prose		Document		Quantitative	
149	Identify country in short article	69	Sign your name	191	Total a bank deposit entry
210	Locate one piece of information in sports article	151	Locate expiration date on driver's license		
224	Underline sentence explaining action stated in short article	180	Locate time of meeting on form		
		214	Using pie graph, locate type of vehicle having specific sales		
226	Underline meaning of a term given in government brochure on supplemental security income	232	Locate intersection on a street map	238	Calculate postage and fees for certified mail
250	Locate two features of information in sports article	245	Locate eligibility from table of employee benefits	246	Determine difference in price between tickets for two shows
		259	Identify and enter background information on application for social security card	270	Calculate total costs of purchase from an order form
275	Interpret instructions from an appliance warranty	277	Identify information from bar graph depicting source of energy and year	278	Using calculator, calculate difference between regular and sale price from an advertisement
280	Write a brief letter explaining error made on a credit card bill	296	Use sign out sheet to respond to call about resident	308	Using calculator, determine the discount from an oil bill if paid within 10 days
304	Read a news article and identify a sentence that provides interpretation of a situation	314	Use bus schedule to determine appropriate bus for given set of conditions		
316	Read lengthy article to identify two behaviors that meet a stated condition	323	Enter information given into an automobile maintenance record form		
328	State in writing an argument made in lengthy newspaper article	342	Identify the correct percentage meeting specified conditions from a table of such information	325	Plan travel arrangements for meeting using flight schedule
347	Explain difference between two types of employee benefits	348	Use bus schedule to determine appropriate bus for given set of conditions	331	Determine correct change using information in a menu
359	Contrast views expressed in two editorials on technologies available to make fuel-efficient cars			350	Using information stated in news article, calculate amount of money that should go to raising a child
362	Generate unfamiliar theme from short poems			368	Using eligibility pamphlet, calculate the yearly amount a couple would receive for basic supplemental security income

Figure 1: *(continued)*

Difficulty Values of Selected Tasks Along the Prose, Document, and Quantitative Literacy Scales

Prose	Document	Quantitative
374 Compare two metaphors used in poem		
382 Compare approaches stated in narrative on growing up	**379 Use table of information to determine pattern in oil exports across years**	**375 Calculate miles per gallon using information given on mileage record chart**
410 Summarize two ways lawyers may challenge prospective jurors	**387 Using table comparing credit cards, identify the two categories used and write two differences between them**	**382 Determine individual and total costs on an order form for items in a catalog**
423 Interpret a brief phrase from a lengthy news article	**396 Using a table depicting information about parental involvement in school survey to write a paragraph summarizing extent to which parents and teachers agree**	**405 Using information in news article, calculate difference in times for completing a race**
		421 Using a calculator, determine the total cost of carpet to cover a room

An Overview of the Contents of the Study

The report begins with an analysis of the labor force status of respondents to the IALS survey by their proficiency levels on the prose and composite skills distribution. Three key labor force activity measures are examined: the civilian labor force participation rate, the unemployment rate, and the employment/population ratio. These measures are supplemented with an analysis of the mean literacy proficiency scores of U.S. adults who were employed, unemployed, and not active in the labor force at the time of the IALS survey. The size and statistical significance of the gaps between the mean proficiency scores of the employed and the unemployed and those not active in the labor force are examined.

The employment rates of U.S. adults in selected literacy proficiency groups are compared to those of adults in other high-income countries who participated in the IALS survey. The mean composite literacy proficiencies of U.S. adults in each labor force activity group also are compared to those of their counterparts in other high-income countries. The literacy proficiency rankings of the employed and the full-time employed in the United States among these high-income countries are examined.

The background questionnaire that was administered as part of the IALS survey captured information on the hours of work for the jobs held by the employed at the time of the survey and the number of weeks that they were employed in the year prior to the survey. The shares of the employed holding full-time jobs by literacy proficiency level are examined. Findings are presented for all of the employed and for men and women separately. In addition, the distributions of the employed by weeks worked during the prior calendar year and by their composite proficiency level also are reviewed and assessed. This provides a way to determine whether more literate workers are more likely to work year-round (40 or more weeks) than their less literate counterparts.

Information on the occupational duties and job titles of the employed was also captured by the IALS survey. The mean proficiency scores of the employed in major occupational groups based on the International Standard Classification of Occupations System (ISCO) are analyzed for each of the three main literacy scales. Differences between the mean proficiency scores of professional/managerial workers in the United States and those in the other major occupational groups are calculated and assessed. The literacy

proficiencies of U.S. workers in each of these major occupational groups also are compared to those of their counterparts in other high-income countries, and rankings are presented of the composite proficiency scores of U.S. workers in each major occupational group among these high-income countries. The literacy proficiencies of U.S. workers in selected class of worker categories (wage and salary workers, self-employed, unpaid family worker) and by their supervisory responsibilities also are examined and assessed.

Findings from the NALS survey and the IALS survey on the weekly and annual earnings of U.S. workers are reviewed. Variations in the weekly earnings of the full-time employed by proficiency level on each of the three literacy scales are examined for all of the employed and for men and women separately. The weekly earnings of the full-time employed by educational attainment and literacy proficiency level also are analyzed. Because the annual earnings of workers are the most important measure of their labor market success, the report examines variations in the annual earnings of workers by proficiency level on each of the three literacy scales. IALS data on the distribution of the employed by quintile of the annual earnings distribution and by their proficiency level on the composite skills distribution are examined. The NALS and IALS data on the statistical links between the annual earnings of workers and their literacy proficiencies are supplemented by findings from the National Longitudinal Survey of Youth (NLSY)[13] on the annual earnings of 32 to 40 year old adults by their educational attainment and their basic academic skills, as measured by the Armed Forces Qualification Test (AFQT).

The findings on the weekly wages and annual earnings of U.S. workers are followed by an analysis of the literacy and quantitative proficiencies of poor/near poor and non-poor U.S. adults. The estimated gaps between the mean literacy and quantitative proficiencies of these two groups are reviewed and assessed. The next section reviews the degree of dependence of U.S. adults and their families on selected types of cash and in-kind public assistance payments to support themselves. Variations in the degree of dependence of 16 to 65 year olds and their families on such public transfers by proficiency level are assessed. The intent is to determine how much more dependent the less literate are on such cash and in-kind transfers in order to support themselves and their families.

The analyses of the links between the weekly and annual earnings of U. S. workers and their literacy proficiencies are followed by a review of the education and training activities of U.S. adults in the year prior to the IALS assessment. The incidence of all education and training activities, job related education and training activities, and employer-sponsored training and education are estimated for workers in various literacy proficiency groups and by the intensity of their literacy engagement at work. The incidences of such education and training activities and the intensity of these activities for U.S. adults is compared to those of their counterparts in other high-income countries.

The ratings by employed adults of their existing reading, writing, and arithmetic skills on their current jobs are analyzed together with their perception of the degree to which their current literacy and quantitative skills restrict job opportunities for them. This analysis is conducted for all employed adults and for those in selected prose, quantitative, and composite proficiency groups. The final section of the monograph summarizes key findings of the research and discusses their public policy implications in a variety of areas, including adult basic education, workplace literacy training, workforce development policies and programs, and the training practices of private and public sector employers.

[13] The National Longitudinal Survey of Youth (NLSY) is a longitudinal survey of a nationally representative sample of approximately 12,600 14 to 21 year olds that was initiated in 1979 by the U.S. Department Labor. The project is managed by Ohio State University's Center for Human Resource Research. Interviews with these youth have been conducted annually or biannually since 1979.

The IALS assessment included a background questionnaire that was used in part to collect data on the labor force activity status of all respondents at the time of the survey and their labor market experiences during the prior calendar year. As noted earlier, the IALS survey was conducted in the United States between October and November of 1994. Respondents' answers to the set of questions on current labor force activities were used to assign them to one of three labor force statuses: employed, unemployed, or not active in the labor force. The employed are those persons who were working at the time of the survey for pay or profit, the unemployed are those who were on layoff or were actively seeking work, and those not active in the labor force are those who were neither employed nor unemployed. This last group includes retirees, those keeping house or responsible for care of family members, students not interested in working and other adults not seeking work at the time of the survey.[14]

Using data on respondents' labor force activity status, we estimated values for the following three conventional labor force activity measures:

- **The labor force participation rate.** This variable represents the ratio of the number of persons in the labor force (employed + unemployed) to the working-age, civilian, non-institutional population (age 16 to 65).[15]
- **The unemployment rate.** This variable represents the ratio of the unemployed to the labor force; i.e., the percent of the labor force that was unable to obtain any employment.
- **The employment/population (E/P) ratio.** This variable is simply the ratio of the employed to the number of persons in the civilian, non-institutional population (age 16 to 65). The value of this E/P ratio is determined by the values of the above two variables.[16] The higher the labor force participation rate and the lower the unemployment rate, the higher will be the employment/population ratio.

Our estimates of the labor force participation rates, unemployment rates and employment/population ratios for the nation's 16 to 65 year old adults in October/November 1994 by proficiency level on the prose and composite scales are displayed in Tables 1 and 2, respectively. On the prose scale, the labor force participation rates of adults rose steadily and strongly with their proficiency level, increasing from 63% for those in Level 1 to a high of 85.4% for those in Level 4 or 5 combined. In these two highest prose proficiency categories, slightly more than 85 of every 100 adults were either working or actively looking for work. Very similar patterns of labor force participation prevailed on the composite skills distribution with only 64 of every 100 adults with a Level 1 composite proficiency active in the labor market versus nearly 90 of every 100 adults in the two highest proficiency categories.[17]

---

[14] The definition of unemployment in the IALS survey is somewhat more liberal than that of the Current Population Survey (CPS), which is used by the U.S. Bureau of Labor Statistics to estimate monthly employment and unemployment across the nation.The IALS survey did not ask respondents to describe the job search methods that they were using to find work and it did not ask them about their availability for work at the time of the survey.The CPS definition of unemployment requires a jobseeker to be available for employment during the reference week, and nearly all must be using active job search methods.

[15] The IALS survey in the United States also excluded college students living on campus from the universe for the study. See: OECD and Statistics Canada, *Literacy in the Information Age*, 2000, Annex B.

[16] The employment/population ratio is determined by the product of the labor force participation rate and (1 – unemployment rate):
E/P = L/P x E/L
Where E/L = (1 – U/L)
L/P = labor force participation rate
U/L = unemployment rate

[17] All of the differences in labor force participation rates by proficiency level on the prose and composite scales were statistically significant except for those in Levels 2 and 3.

Table 1:

Labor Force Participation Rates, Unemployment Rates, and Employment/Population Ratios of U.S. Adults (Age 16 to 65), by Prose Proficiency Level (in %)

	Prose Proficiency				
Labor Force Activity Measure	**Level 1**	**Level 2**	**Level 3**	**Level 4 or 5**	**All**
Labor Force Participation Rate	63.0	77.2	78.8	85.4	76.8
Unemployment Rate	9.7	5.2	4.6	2.0	4.9
Employment/Population Ratio	56.9	73.2	75.2	83.7	73.0

Source: IALS Survey, 1994.

Table 2:

Labor Force Participation Rates, Unemployment Rates, and Employment/Population Ratios of U.S. Adults (Age 16 to 65), by Composite Proficiency Level (in %)

	Composite Proficiency				
Labor Force Activity Measure	**Level 1**	**Level 2**	**Level 3**	**Level 4 or 5**	**All**
Labor Force Participation Rate	63.8	75.1	77.9	89.7	76.8
Unemployment Rate	10.2	5.1	4.0	2.4	4.9
Employment/Population Ratio	57.3	68.7	74.8	87.6	73.0

Source: IALS Survey, 1994.

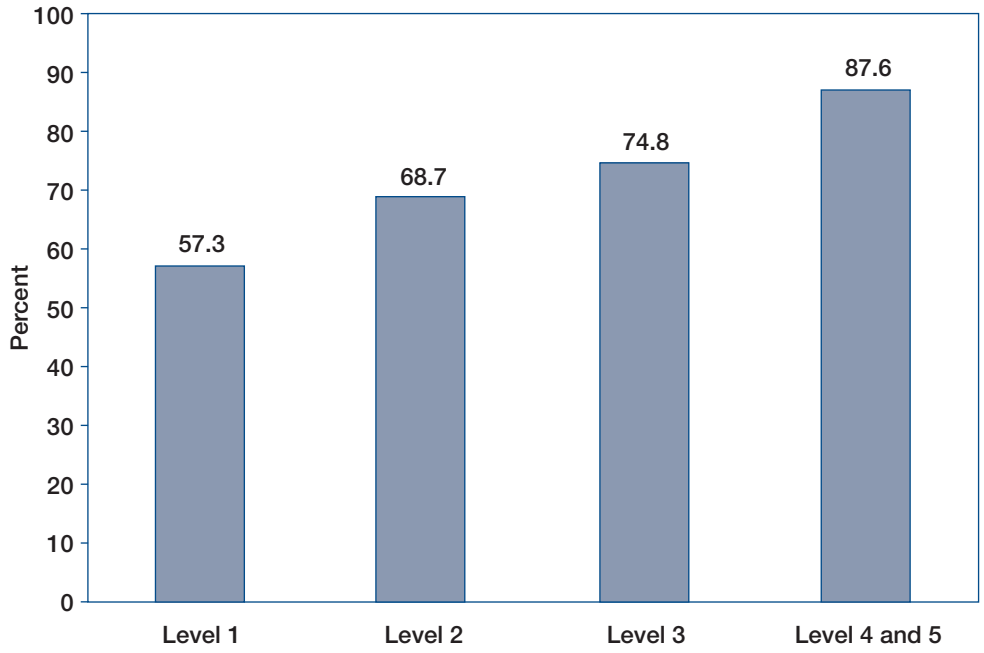
Unemployment rates of adults declined steadily as their prose and composite proficiencies improved. On the prose scale, the unemployment rates ranged from a low of 2% for those workers in proficiency Level 4 or 5 to a high of just under 10 % for those in the lowest proficiency category. U.S. workers with the most limited prose proficiencies were nearly five times as likely to be unemployed as their counterparts in the two highest prose proficiency levels. Again, very similar patterns of unemployment rates by proficiency level prevailed in the composite skills distribution. Earlier analyses by OECD of the durations of unemployment experienced by workers in the United States and other countries revealed that the unemployed with lower prose proficiencies were much more likely to be members of the long-term unemployed (more than 52 weeks of unemployment) than the short-term unemployed.[18]

[18] The findings for the United States revealed that unemployed workers in prose proficiency Levels 1 and 2 accounted for 40% of the short-term unemployed but 80% of the long-term unemployed; i.e., those unemployed for 52 weeks or longer. See: OECD and Statistics Canada, *Literacy in the Information Age*, 2000, pp. 66-67.

Given the higher rates of labor force attachment among the more literate members of the adult population and their lower likelihood of being unemployed when they did seek work, their employment/population ratios were much higher than those of their less literate counterparts. On the prose scale, the employment/population ratios of adults rose from just under 57% for those in Level 1 to nearly 84% for those in Level 4 or 5. On the composite proficiency scale, the employment/population ratios increased from 57% for those persons in Level 1 to a high of nearly 88% for those in Level 4 or 5, a difference of 30 percentage points (Figure 2). All of the differences in employment/population ratios across proficiency levels on the composite skills distribution were statistically significant at the .01 level.

Figure 2:

Employment/Population Ratios of U.S. Adults (Age 16 to 65) by Composite Proficiency Level



Source: IALS Survey, 1994.

The labor force data from the IALS survey also can be analyzed for men and women separately. Employment rates at the time of the survey for men and women by proficiency level on the prose, document, and composite literacy scales are displayed in Table 3. On each of these literacy scales, the employment rates of men rose steadily with their proficiency levels. For example, on the prose scale, the employment rates of men increased from slightly under 64% for those with a Level 1 prose proficiency to a high of 91% for those men with a Level 4 or 5 proficiency (Figure 3). All of these differences in employment rates of men across the prose proficiency levels were significant at the .05 or .01 level. The gap between the employment rates of men with the highest prose proficiencies and those with the most limited prose proficiencies was nearly 28 percentage points. Very similar gaps between employment rates prevailed on each of the other scales.

Table 3:

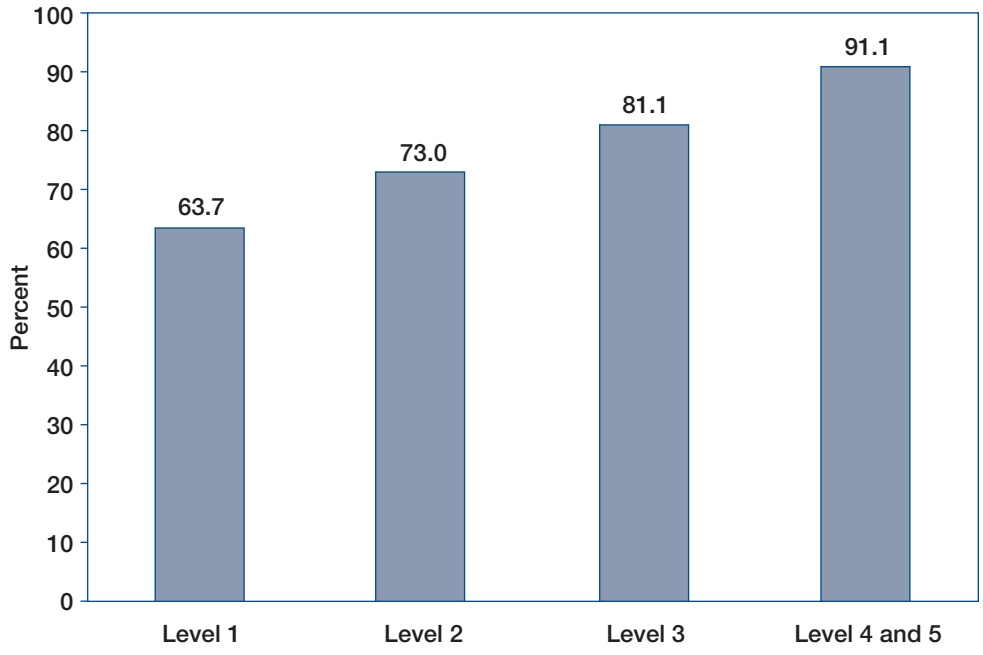
Employment Rates of U.S. Men and Women (Age 16 to 65), by Literacy Proficiency Level (in %)

Gender/Scale	Level 1	Level 2	Level 3	Level 4 or 5	All
Men					
Prose	63.7	73.0	81.1	91.1	75.9
Document	65.4	74.2	79.2	91.5	75.9
Composite	65.0	72.5	77.9	93.3	75.9
Women					
Prose	44.8	64.5	68.6	75.9	62.9
Document	48.4	61.9	71.5	77.0	62.9
Composite	46.2	63.4	69.1	79.4	62.9

Source: IALS survey; tabulations by the authors.

Figure 3:

Employment Rates of U.S. Men (Age 16 to 65), by Prose Proficiency Level



Source: IALS Survey, 1994.

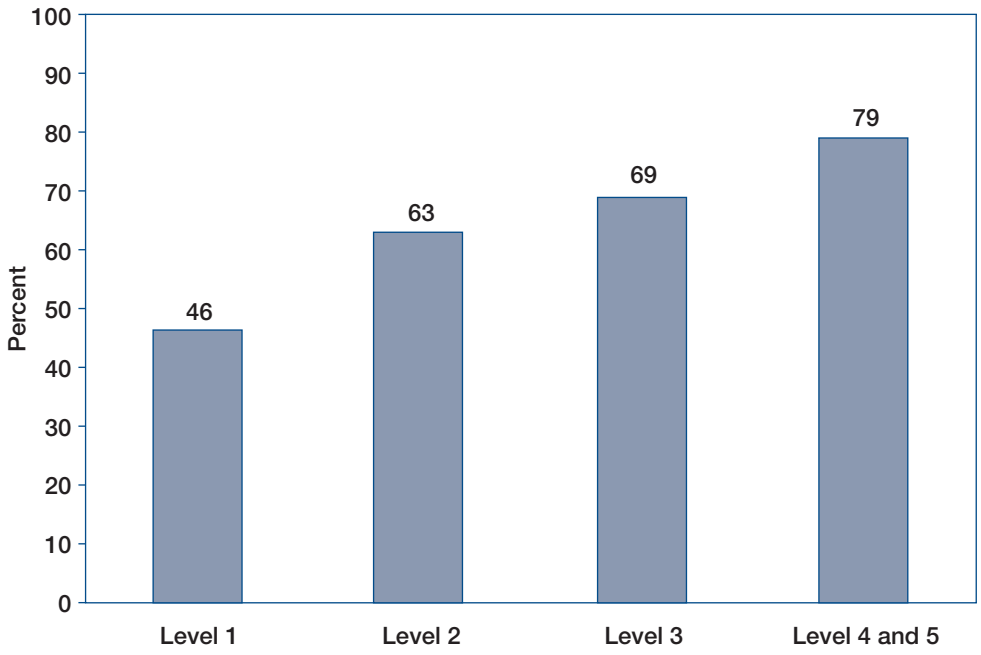
Among women, there also were strong links between their literacy proficiencies and their employment rates on each of the literacy scales. Overall, 63% of the women were employed at the time of the IALS survey. The percent of women with a job ranged from a low of 46% for those in proficiency Level 1 on the composite scale to 63% for those in proficiency level two and to a high of just under 80% for those in proficiency Level 4 or 5 (Figure 4).[19] The gap between the employment rates of women with the highest composite proficiencies and those with the lowest proficiencies was 33 percentage points. These are very large differences in employment rates.

Labor Force Behavior of U.S. Adults and Their Literacy Proficiencies: Findings of the 1992 NALS Survey

The strong statistical associations between the literacy skills of U.S. adults and their labor force participation are not confined to the IALS survey. The findings of the NALS survey also provide substantial empirical evidence on the strong links between the literacy proficiencies of the nation's working-age population (age 16 and older) and their labor force participation rates.[20] The NALS survey was conducted two years before the IALS, when the national economy was just in the early stages of recovery from the 1990-91 recession and employment growth was still quite modest. On each of the three literacy scales (prose, document, and quantitative), the labor force participation rates of working-age residents (age 16 and older) rose steadily and

Figure 4:

Employment Rates of U.S. Women (Age 16 to 65), by Composite Proficiency Level



Source: IALS Survey, 1994.

[19] All of the differences in employment rates of women across composite proficiency levels were statistically significant at the .05 or .01 level except for the differences between those in proficiency levels 2 and 3.

[20] For a more detailed set of findings on the links between the literacy proficiencies of the working-age population and their labor force behavior at the time of the NALS survey, see: Andrew Sum, *Literacy in the Labor Force*, 1999.

strongly with their proficiency level (Table 4).[21] For example, the labor force participation rates of adults (age 16 and older) rose from 49 percent among those in proficiency Level 1 on the prose scale to 77% for those in proficiency Level 3 to a high of 91% for those in proficiency Level 5 (Figure 5). Results were similar for the document and quantitative scales.

Table 4:

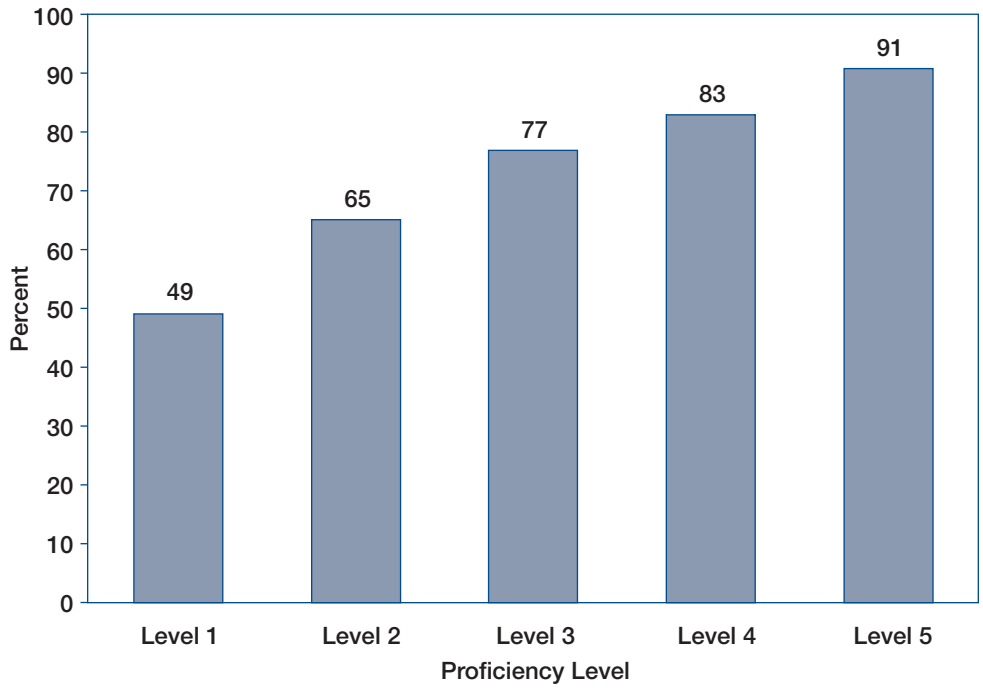
Civilian Labor Force Participation Rates (in %) of U.S. Adults (Age 16 and Older), by Proficiency on Each Literacy Scale

	Level					
Literacy Scale	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**All**
Prose	49 (1.0)	65 (0.8)	77 (0.6)	83 (0.7)	91 (1.3)	69 (0.4)
Document	48 (1.0)	67 (1.0)	78 (0.6)	86 (0.7)	91 (1.6)	69 (0.4)
Quantitative	48 (1.1)	68 (0.8)	76 (0.6)	84 (0.8)	85 (1.4)	69 (0.4)

Note: Numbers in parentheses are standard errors.
Source: NALS Survey, 1992.

Figure 5:

Civilian Labor Force Participation Rates (in %) of U.S. Adults (Age 16 and older), by Prose Proficiency Level



Source: IALS Survey, 1994.

[21] With the exception of the one percentage point difference between the labor force participation rates of those adults in proficiency Level 4 or 5 on the quantitative scale, all of the differences in participation rates across the three scales are statistically significant at the .01 level.

The gaps between the labor force participation rates of working-age adults by proficiency level are even higher in the NALS survey than they were in the IALS survey. This finding largely reflects the fact that the NALS survey covered the entire working-age, non-institutional population while the IALS survey was restricted to those 16 to 65 years of age. Very high fractions of the nation's older adult population (65 and older) had proficiencies in Levels 1 and 2, and their overall labor force participation rates were quite low. Still, the data show that even among this older population, the degree of attachment to the labor market is also strongly linked to their literacy proficiencies and educational attainment.[22] The best educated and the most literate older adults were considerably more likely to be active in the labor force than their less educated and less literate counterparts.

Comparisons of the Employment Rates of U.S. Adults by Proficiency Level with Those of Their Peers in 13 Other High-Income Countries

As noted earlier, the IALS assessment was conducted in a total of 23 separate countries, including 16 high-income countries. Findings on the employment/population (E/P) ratios for 16 to 65 year old adults in 14 of the high-income countries by selected proficiency levels on the prose, document, and quantitative scales are displayed in Table 5. [23] In each of these 14 countries, the employment rates of adults in Levels 3 through 5 on each literacy and quantitative scale were higher than those in proficiency Levels 1 and 2 combined. The size of these employment rate differences, however, varied fairly widely across these countries on each of the three scales. For example, on the prose scale, the differences between the E/P ratios of those adults in Levels 3 through 5 and those in Levels 1 and 2 ranged from lows of 8 percentage points in Switzerland and Denmark to highs of 22 to 25 percentage points in the United Kingdom, Finland and Belgium. In the United States, the difference between the employment rates of these two groups was 12 percentage points.

How did the employment rates of U.S. adults in these different proficiency levels compare to those of their counterparts in these other high-income countries? The employment rates of U.S. adults in the two lowest proficiency levels (Levels 1 and 2) ranked second or third highest on each of the three scales. On the prose scale, only Switzerland adults with a Level 1 or 2 proficiency had a higher employment rate than their peers in the United States.[24] U.S. adults with Levels 3 to 5 proficiencies ranked second highest on two of the three scales (document and quantitative) and 4th highest on the prose scale.[25] Only Norwegian adults had a significantly higher employment/population ratio than U.S. adults in Levels 3 through 5 on the document and quantitative scales. The work rates of non-elderly U.S. adults were thus among the highest in the industrialized world in the mid-1990s for both those with below- average and above-average literacy skills. The more literate adults, however, were considerably more likely to be employed. The greater flexibility of U.S. labor markets, including lower relative wages at the low-skilled end of the labor market, is believed to contribute to higher employment rates among the less skilled in this country.[26]

---

22 For findings on the literacy proficiencies of the nation's older population (65 and older) and their labor market behavior, see: Helen Brown, Robert Prisuta, Bella Jacobs, and Anne Campbell, *Literacy of Older Adults in America*, National Center for Education Statistics, Washington, D.C., 1995. There are also very strong links between the educational attachment of the nation's older workers and their labor force participation behavior and unemployment rates. See: Peter Doeringer, Andrew Sum, and David Terkla, *Older Workers: An Essential Resource*, Massachusetts Blue Ribbon Commission on Older Workers, Boston, 2001.

23 In this table, the findings for English-speaking Canada and French Canada are combined as are those for England and Northern Ireland in the United Kingdom and the French, German, and Italian-speaking regions of Switzerland. In other tables, the findings for these language and nationality groups will be presented separately. The findings for France and Italy were excluded from the analysis by OECD.

24 From a statistical significance perspective, the E/P ratios of Denmark and Norway were tied with those of U.S. adults for second place.

25 The United States was statistically tied for second place in its performance on the prose scale with Denmark and Switzerland.

26 See: Ronald G. Ehrenberg and Robert S. Smith, *Modern Labor Economics: Theory and Public Policy*, (7th Edition), Reading, MA: Addison-Wesley, 2000.

Table 5:

Employment/Population Ratios for Adults (Age 16 to 65), by Proficiency Level on Each Literacy Scale for 14 Selected High-Income Countries

	Prose		Document		Quantitative	
Nation	**Levels 1-2**	**Levels 3-5**	**Levels 1-2**	**Levels 3-5**	**Levels 1-2**	**Levels 3-5**
Australia	60.0	79.7	57.6	82.1	56.8	81.6
Belgium, Flanders	52.1	77.7	49.5	76.5	47.9	77.3
Canada	56.4	75.3	55.0	76.7	55.3	76.2
Denmark	67.9	81.1	62.1	81.3	61.5	80.0
Finland	54.5	78.0	53.3	78.9	56.0	76.7
Germany	52.2	66.4	49.3	66.7	47.5	65.1
Ireland	42.7	64.7	42.7	67.2	40.5	67.6
Netherlands	50.6	73.1	46.5	74.1	46.4	73.5
New Zealand	58.7	78.3	56.9	82.5	58.4	80.1
Norway, all	68.6	86.1	65.4	86.6	68.1	85.1
Sweden	63.1	80.6	61.6	80.4	64.1	79.3
Switzerland, all	73.4	81.0	73.0	79.3	71.0	79.4
United Kingdom	57.3	79.1	55.4	80.5	56.2	79.6
United States	68.7	80.7	66.8	83.2	67.4	81.5
U.S. Rank	2nd (Tied)	4th	2nd	2nd	3rd	2nd (Tied)

Source: OECD and Statistics Canada, *Literacy in the Information Age,* 2000, Tables 3.6 and 3.7

Gaps in the Mean Literacy Proficiencies of U.S. Adults by Labor Force Status

The distribution of the literacy scores of U.S. adults on each literacy scale was examined, and the findings were used to estimate the mean scores and standard deviations for each labor force subgroup. The mean proficiency scores of each group on each of the four scales are displayed in Table 6. On each of the four scales, the mean scores of the employed substantially and significantly exceeded those of the unemployed and those not active in the labor force. The size of the gaps in the mean scores of the employed and the unemployed ranged from 39 points on the prose scale to 45 points on the quantitative scale (See Table 6). Each of these differences was statistically significant at the .01 level. The mean scores of the employed also exceeded those of persons not active in the labor force at the time of the IALS survey, with the size of these gaps ranging from approximately 28 points on the prose and composite scales to a high of 33 points on the document scale. All of these differences in mean scores were statistically significant at the .01 level.

Table 6:

Mean Literacy Proficiencies of U.S. Adults (Age 16 to 65), by Labor Force Status

Proficiency Scale	Employed	Unemployed	Not in Labor Force	Employed-Unemployed	Employed-Not in Labor Force
Prose	284	245	256	39***	28***
Document	279	243	246	36***	33***
Quantitative	286	241	255	45***	31***
Composite	283	243	255	40***	28***

Note: *** sig. at .01 level
Source: IALS Survey, 1994.

The size of the gaps between the mean literacy proficiencies of the employed and those of the unemployed and inactive labor force members can be put into perspective by comparing them to the value of the standard deviation of the distribution of composite test scores for the employed.[27] How large are these differences in mean score performance in standard deviation units? The 40 point gap between the mean composite scores of the employed and the unemployed was equivalent to .63 standard deviations, a very sizable gap, while the gap between the mean proficiencies of the employed and those not active in the labor force was .44 standard deviations (Table 7).[28] Clearly, the average unemployed and otherwise jobless adults in the United States had a low proficiency score on each of the four literacy scales. While the unemployed and those not active in the labor force are a very heterogeneous group in terms of their formal schooling and literacy proficiencies, many of them have limited human capital skills that will constrain their future employability and their real earnings from employment. Very strong labor market conditions at the end of the 1990s decade allowed many more members of the unemployed and economically disadvantaged to gain employment, but real weekly wages of the least well educated adults remained quite low even at the height of the labor market boom in 2000.[29] In more slack labor market conditions, these less well educated and less literate workers can expect to face greater difficulties in gaining employment. The bulk of the employment declines in the United States between 2000 and 2002 took place among native-born workers lacking any post-secondary schooling. This was true both for younger adults (age 16 to 24) and older adults (age 25 and older).[30]

[27] The standard deviation is a measure of the degree of dispersion in test scores around the mean of the distribution.The composite test scores of the unemployed and those not active in the labor force were characterized by a higher degree of dispersion, with the standard deviations for these two groups being 77 and 72 points, respectively.

[28] On the NALS survey, the gap between the mean test scores of the employed and those not active in the labor force was larger than that between the employed and unemployed.This result was primarily attributable to the inclusion of persons older than 65 in the NALS survey.Many of the older adults who were not active in the labor force had very low proficiency scores.Their inclusion in the analysis, thus, lowered the mean literacy scores of those adults not active in the labor force. See: Andrew Sum, *Literacy in the Labor Force*, 1999, Chapter 2.

[29] For example, during calendar year 2000, the median weekly earnings of full-time employed adults (25 and older) in the U.S. were $360 for those lacking a high school diploma/GED certificate versus $560 for high school graduates, and $896 for those workers with a bachelor's or higher degree. See: U.S. Bureau of Labor Statistics, *Usual Weekly Earnings of Wage and Salary Workers: 2000*, Washington, D.C., 2001.

[30] See: Andrew Sum, Ishwar Khatiwada, and Mykhaylo Trubs'kyy with Sheila Palma, *Still Young, Restless, and Jobless*, Center for Labor Market Studies, Northeastern University, Boston 2004.

Table 7:

Size of the Mean Composite Skills Gaps Between Employed and Unemployed U.S. Adults (Age 16 to 65), and Between the Employed and Those Out of the Labor Force, in Standard Deviation Units

Comparison	Size of Gap in Mean Scores	Standard Deviation	Size of Gap in Standard Deviation Units
Employed vs. unemployed	39.9	63.0	.63
Employed vs. out of labor force	27.8	63.0	.44

Source: IALS survey, 1994; tabulations by the authors.

Comparisons of the Mean Composite Proficiencies of the U.S. Labor Force with Those in 19 Other High-Income Countries

The IALS assessment also produced estimates of the literacy proficiencies of the adult population in 22 other countries, including 16 high-income countries and several language subgroups within a number of these countries, including Canada and Switzerland. Literacy data were available for 19 other high-income countries/language subgroups.[31] The mean composite proficiency scores of adults in each labor force subgroup in these other 19 high-income countries are displayed in Table 8, together with findings for their U.S. counterparts.

Table 8:

Comparisons of the Mean Composite Proficiencies of Adults (Age 16 to 65) in the United States and 19 Other High-Income Countries by Labor Force Status

Labor Force Status	U.S.	19 Other High-Income Countries	U.S. – 19 Other Countries	Sig.
Employed	283	279	+4	.05
Unemployed	243	251	-8	--
Out of labor force	255	263	-8	--

Note: -- indicates difference between the two sample means was not statistically significant at the .05 level.
Source: IALS Survey, 1994

[31] The names of these 19 countries and language subgroups within countries are displayed in Table 9, with the exception of France.

A review of the findings in Table 8 reveals that employed U.S. adults obtained a mean score on the composite scale that was four points higher than that of their employed counterparts in the 19 other high-income countries (283 vs. 279). This difference was less than .1 standard deviations, but was statistically significant at the .05 level. In contrast, the mean composite scores of the unemployed and those not active in the labor force in the United States were seven to eight points below those of their counterparts in these other high-income countries, but these differences were not quite large enough to be classified as statistically significant at the .05 level.[32]

A more disaggregated analysis of the mean literacy scores of the employed and the full-time employed in the United States and 18 other high-income countries is presented in Table 9. The mean literacy performance of U.S. workers on these three scales was typically below the average for these 19 countries/language subgroups. For all of the employed, the United States comparatively fared best on the prose scale, ranking 8th highest among the 19 countries, but fell in the bottom half of the distribution for document (13th place) and quantitative skills (11th place). Very similar findings prevailed for the full-time employed; i.e. those working 35 or more hours per week at the time of the IALS survey. The United States ranked 7th highest on the prose scale, but fared poorly on both the document (15th place) and quantitative scales (12th place). Similar to the previous findings for all adults, the literacy proficiencies of U.S. workers are at best "average" among all high-income countries."Mediocre" is the label one could attach to describe the average literacy performance of the U.S. worker in the mid-1990s.[33]

Previous analyses of the IALS data for the United States and other high-income countries also revealed that inequality in literacy proficiencies among the entire adult population was more pronounced in the United States than in most other high-income countries.[34] To determine whether this pattern also held true for the employed, we compared the composite proficiencies of employed adults in the United States and the other high-income countries at each tenth percentile along the skills distribution for the United States and these other countries combined (Table 10). For U.S. workers, at the 10th, 20th, 30th, and 40th percentiles, their composite skills were statistically identical to those of their peers in the other high-income countries. From the 50th percentile on up, the composite proficiencies of U.S. workers were significantly higher than those of their counterparts in these other high-income countries, with the size of these differences rising from 6 points at the 50th percentile to 12 points at the 90th percentile (Table 10). The proficiency scores of the most literate U.S. workers are among the best in the world while workers in the bottom of the distribution fare quite poorly. The proficiency scores of the average adult, especially women, have been found to be significant predictors of their economic growth rates.[35]

---

[32] Due to the greater dispersion in the composite proficiency scores of these two groups and smaller sample sizes, the standard errors of mean estimates of composite skills for the unemployed and those not active in the labor force are greater than those for the employed.

[33] See: Andrew Sum, Irwin Kirsch, and Robert Taggart, *The Twin Challenges of Mediocrity and Inequality: Literacy in the U.S. from an International Perspective*, Center for Global Assessment, Policy Information Center, Educational Testing Service, Princeton, NJ, 2002.

[34] The U.S. typically ranked 1st or 2nd highest among 20 high-income countries in the standard deviations of its composite test scores. See: Ibid, Table 16, p. 25.

[35] See: Serge Coulombe, Jean-Francoic Tremblay, and Sylvie Marchand, *Literacy Scores, Human Capital, and Growth Across Fourteen OECD Countries*, Statistics Canada, June 2004.

Table 9:

Mean Proficiency Scores of the Employed and Full-Time Employed in the United States and 18 Other High-Income Countries

	Employed			Full-time Employed		
	Prose	Document	Quantitative	Prose	Document	Quantitative
Australia	286	285	288	282	284	289
Belgium, Flanders	281	288	294	279	288	295
Canada, English	293	295	296	288	293	295
Canada, French	276	283	284	273	277	278
Denmark	278	299	304	278	299	304
Finland	294	297	294	295	298	294
Germany	281	292	300	280	291	300
Great Britain	279	282	282	278	283	284
Ireland	276	271	278	277	273	281
Italy	253	249	260	253	250	261
Netherlands	291	297	298	288	295	298
New Zealand	286	282	283	285	281	284
Northern Ireland	275	276	282	276	278	286
Norway, Bokmal	291	301	300	291	304	302
Sweden	305	310	311	307	313	314
Switzerland, French	270	280	288	269	280	289
Switzerland, Germany	268	277	285	271	280	289
Switzerland, Italian	265	271	278	266	273	279
United States	284	279	286	282	278	286
U.S. Rank Among 19 Countries	8th	13th (tie)	11th	7th (tie)	15th (tie)	12th (tie)

Note: Only 18 of the 19 countries are listed here. Data from France are absent.
Source: IALS Survey, 1994; ETS tabulations

Table 10:

Comparisons of the Composite Proficiencies of the Employed in the United States and 19 Other High-Income Countries at Various Points Along the Composite Scale

Percentile	U.S.	19 Other High-Income Countries	U.S. – 19 Other Countries	Sig. of Difference
10	205	210	-5	--
20	238	240	-2	--
30	259	258	+1	--
40	277	273	+4	--
50	291	285	+6	.01
60	304	297	+8	.05
70	318	309	+9	.01
80	333	323	+11	.01
90	354	343	+12	.01
Differences				
90 – 10	150	133	+17	
90 – 20	116	103	+13	
90 – 50	63	58	+5	
80 – 20	95	83	+12	
80 – 10	129	113	+16	

Note: -- indicates no significant difference in test scores between these two groups.
Source: IALS Survey, 1994.

As a consequence of these differences in literacy performance across the distribution, there are very large differences in performance between U.S. workers at the top (90th and 80th percentiles) and the bottom of the composite skills distribution (10th and 20th percentiles). For example, the gap between the literacy proficiency scores of U.S. workers at the 90th and 10th percentiles was 150 points versus only 133 points for the other high-income countries and, the test score gap between the 90th and 20th percentiles in the United States was 116 points versus 103 points among the other high-income countries. The greater inequality in the U.S. score distribution does generate greater inequality in the wage and earnings distribution of this country, particularly given the higher returns to schooling and literacy proficiencies in the United States.[36]

[36] Lower literacy proficiency at the bottom of the distribution also reduces the number of years of schooling completed, thereby contributing to educational inequality. For a review of the evidence on the statistical links between literacy proficiencies, schooling, work experience and earnings across IALS countries, see: (i) OECD and Statistics Canada, *Literacy in the Information Age,* 2000, Chapter 4; (ii) Dan Devroye and Richard Freeman, *Does Inequality in Skills Explain Inequality of Earnings Across Countries?"* National Bureau of Economic Research, Cambridge, MA, May 2000.

The Full-Time/Part-Time Status of the Employed in the United States

The labor force section of the IALS background questionnaire also collected information on the characteristics of the jobs held by the employed at the time of the survey, including the weekly hours of work on those jobs. Persons employed for 35 or more hours per week are classified as full-time workers in most household surveys, including the monthly Current Population Survey (CPS) which is used by the U.S. Bureau of Labor Statistics to estimate the national number of employed and unemployed persons and the monthly unemployment rate.[37] Knowledge of the full-time/part-time status of the employed is desirable for many reasons. There are a number of important economic advantages to workers from holding full-time jobs, including higher hourly and weekly earnings, an increased likelihood of receiving key employee benefits such as health insurance coverage, pensions, and tuition reimbursement, a greater likelihood of receiving training both on and off the job, and a higher return to full-time work experience in the form of higher future wages.[38]

Estimates of the percent of the employed working full-time in the United States at the time of the IALS survey by proficiency level on each of the four scales are presented in Table 11. Overall, 80% of the employed in the United States were working full-time. With few exceptions, primarily on the quantitative scale, the percentage of the employed who held full time jobs did not vary significantly by proficiency level.[39] For example, on the prose scale, the share of the employed working full-time was 82% for those in Levels 1 and 2 and 81% for those in Levels 4 and 5. None of these differences were statistically significant. On the quantitative scale, however, differences in full-time employment share were larger, ranging from a low of 74% for those in Level 3 to a high of slightly more than 87% for those in Level 4 or 5.

Table 11:

Percentage of Employed U.S. Adults Working Full-Time, by Proficiency Level on Each Literacy Scale

Literacy Scale	Level 1	Level 2	Level 3	Level 4 or 5	Overall
Prose	82.1	82.6	76.3	81.1	80.0
Document	82.1	82.5	75.2	82.8	80.0
Quantitative	79.6	81.0	73.7	87.2	80.0
Composite	82.1	84.9	74.2	85.0	80.0

Source: IALS Survey, 1994.

[37] For a review of the employment concepts and measures underlying the CPS household survey, see: U.S. Bureau of Labor Statistics, *Employment and Earnings*, January 2003, Appendix A, Washington, D.C., 2003.

[38] For a review of the empirical evidence on the economic advantages of full-time employment, see: Andrew Sum, Neeta Fogg, and Garth Mangum, *Confronting the Youth Demographic Challenge: The Labor Market Prospects of Out-of-School Young Adults*, Sar Levitan Center for Social Policy Studies, Johns Hopkins University, Baltimore, 2000.

[39] On the quantitative scale, the employed in proficiency Levels 4 or 5 were significantly more likely to be working full-time than their counterparts in each of the three lower proficiency levels. On the document and composite scales, the employed in Levels 4 or 5 were significantly more likely to be working full-time than their peers in Level 3.

The associations between the likelihood of full-time work among the employed and quantitative proficiencies are presented for men and women separately in Table 12. Among men, nearly 88% of the employed were working full-time at the time of the IALS survey. The fraction of employed males with full-time jobs ranged from a low of just under 80% for those in proficiency Level 1 to a high of 91% for those men in the two highest quantitative proficiency levels (4 and 5). Employed men in proficiency Level 2 and higher were significantly more likely than their counterparts in proficiency Level 1 to be working full-time, but there were no significant differences among the three other quantitative proficiency groups.

Among women, nearly 72% of the employed reported that they were working full-time. The pattern of full-time employment shares, however, was quite mixed, with women in both the lowest proficiency level (79%) and the highest proficiency levels (81%) being most likely to work full-time while employed women in proficiency Level 3 (61%) were least likely to be working full-time. Women in proficiency Level 4 or 5 were significantly more likely to be working full-time than their peers in Level 3, but none of the other differences were statistically significant.

By combining the findings on the employment rates of women by composite proficiency level with the share of the employed working full-time in each proficiency level, we can estimate full-time employment/population ratios for women. These full-time E/P ratios ranged from a low of only 36% for those in composite proficiency Level 1 to a high of 64% for those women in proficiency Level 4 or 5. Women in the two highest proficiency levels on the composite scale were significantly more likely to have been employed full-time than their counterparts in each of the other three proficiency levels.

Table 12:

Percentage of U.S. Employed Men and Women Working Full-Time, by Quantitative Proficiency Level

Gender	Level 1	Level 2	Level 3	Level 4 or 5	All Employed
Men	79.7	89.0	78.4	91.1	87.8
Women	78.7	73.7	61.4	81.0	71.7

Source: IALS Survey, 1994.

The Literacy Proficiencies of the Employed and Annual Weeks Worked

Does the annual work effort of the employed in the United States tend to vary by their literacy proficiencies? To the extent that higher literacy proficiencies promote access to more stable, year-round jobs and to higher wage and more satisfying jobs, one would expect that workers with stronger literacy skills would work more weeks during the year.[40] The IALS survey's background questionnaire collected information on the employment status of workers in the 52-week period prior to the survey and on their weeks of paid employment over this one year period. The weeks worked by the employed were assigned to one of the following four categories: 1-13 weeks, 14-26 weeks, 27-39 weeks, and 40 or more weeks.

The percentage distributions of the employed by weeks worked and by proficiency level on the quantitative scale are displayed in Table 13. Overall, 85% of the employed worked for 40 or more weeks during the previous 52-week period, another 4% were employed between 27 and 39 weeks, and the remaining 11% worked less than half of a year. Those workers with Level 4 or 5 quantitative proficiencies were the most likely to be employed for 40 or more weeks. Over 91% of the workers with Level 4 or 5 proficiencies worked for 40 or more weeks versus only 80% of those in Level 1 and approximately 82% of those in Level 2. All of the differences between the share of workers in Level 4 or 5 working 40 or more weeks and those of their less skilled counterparts were statistically significant.[41]

Similar findings prevailed when the composite skills distribution was used to conduct this analysis. The percentage of the employed who worked 40 or more weeks ranged from a low of slightly under 80% for those in proficiency Level 1 to a high or more than 91% for those in the two highest composite proficiency levels (Figure 6).

Table 13:

Percentage Distribution of Employed Adults (Age 16 to 65), by Weeks Worked in the Previous 52 Weeks, by Quantitative Proficiency Level

Weeks Worked	Level 1	Level 2	Level 3	Level 4 or 5	Overall
1 – 13	7.4	5.6	5.4	2.8	5.1
14 – 26	7.9	6.9	4.5	4.1	5.5
27 – 39	4.7	5.9	4.3	1.7	4.1
40 or more	80.0	81.8	85.8	91.4	85.3

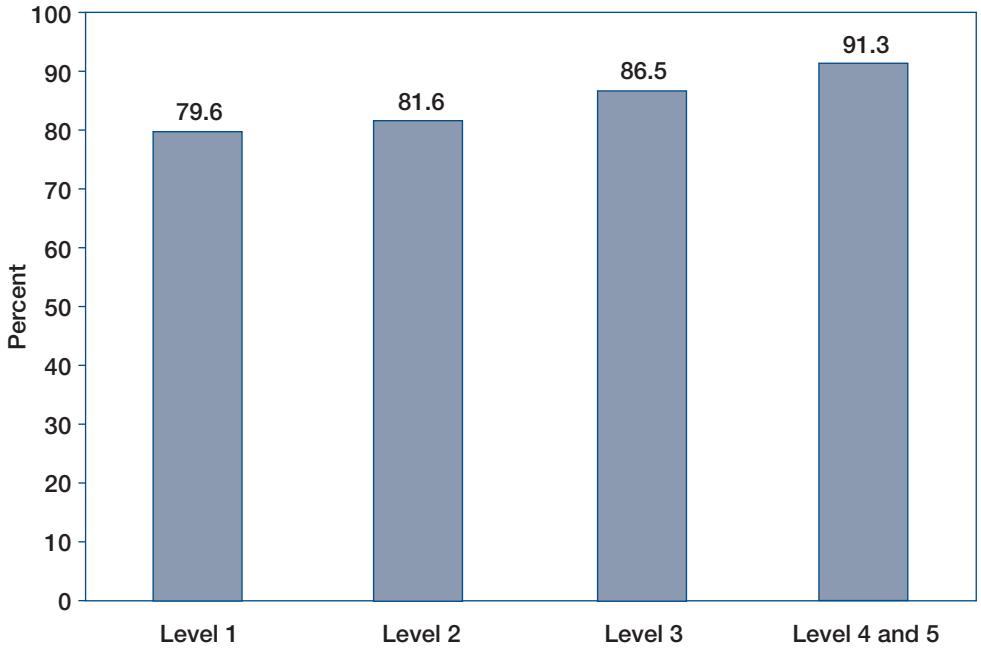
Source: IALS survey, 1994; tabulations by the authors.

[40] In the empirical labor supply literature, the labor force participation behavior of women and their annual weeks and hours of employment are significantly and positively influenced by their expected market wages. See: Solomon Polachek and Ralph Siebert, *The Economics of Earnings*, Cambridge University Press, 1996.

[41] The test was a t-test of the differences between two sample proportions involving head to head comparisons with those in Levels 4 and 5.

Figure 6:

Percentage of the Employed Working 40 or More Weeks in the Previous 52 Weeks, by Composite Proficiency Level



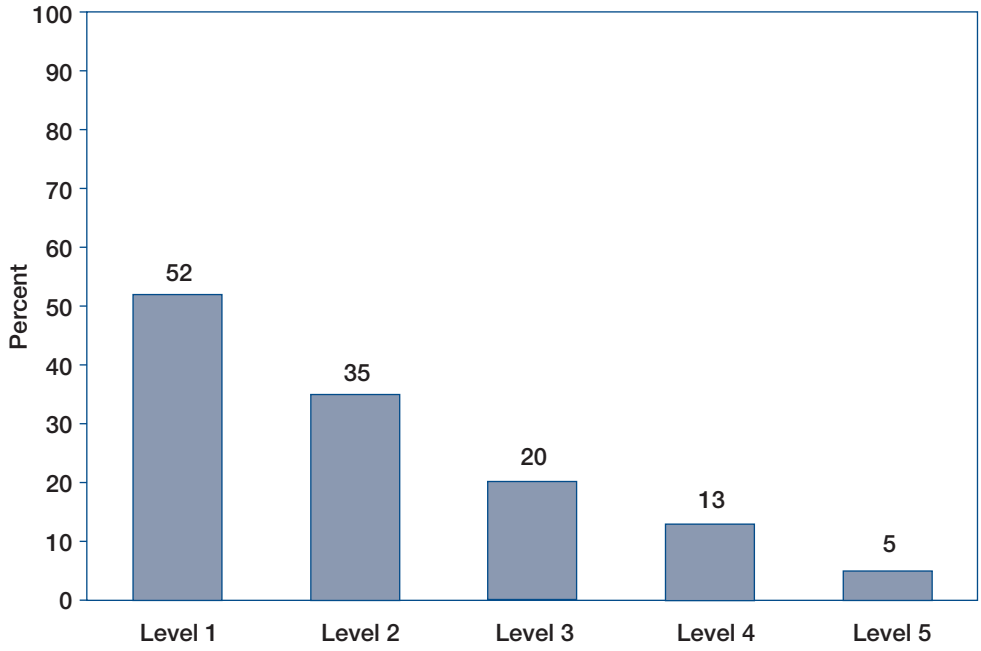
Source: IALS survey, 1994; tabulations by the authors.

The 1992 NALS survey found statistically significant differences between the mean prose, document, and quantitative proficiencies of the employed who worked 40 or more weeks and those who worked 26 weeks or less. The mean proficiency scores of those working 40 or more weeks exceeded those of persons working six months or less by 14 to 19 points on each of the three scales. Each of these differences was statistically significant at the .01 level.[42] The percentage of adults who were non-workers also varied quite widely by proficiency level on each of three scales. For example, on the prose scale, only 5% of those in Level 5 did not perform any paid work during the prior year versus 35% of those persons in proficiency Level 2 and 52% of those in the lowest proficiency level (Figure 7).

[42] See: Andrew Sum, *Literacy in the Labor Force*, 1999, Chapter 1, Table 1.13, p. 43.

Figure 7:

Percentage of U.S. Adults (Age 16 and Older) With No Paid Employment in the Previous 52 Weeks, by Prose Proficiency Level



Source: IALS Survey, 1994; tabulations by the authors.

The Literacy Proficiencies of the Employed by Major Occupational Group

During the past few decades, the occupational composition of employment in the United States has shifted away from many blue collar occupations, especially semi-skilled production and operative positions, entry level clerical occupations, and farm/forestry/fishing occupations, and toward both higher level white collar occupations (professional, managerial, and high level sales positions) and service occupations.[43]

Over the 1992-2000 period of sustained high level job growth, employment of professional, managerial, and high level sales workers in the United States increased at rates well above the average for all occupations.[44] During this eight-year period, employment in these three sets of occupations increased by nearly 11.6 million, accounting for nearly 70% of the net change in employment across the nation.[45]

The U.S. Bureau of Labor Statistics (BLS) projects that these trends in occupational employment will continue throughout the current decade due to the effects of changes in the structure of employment by industry and to changes in occupational staffing patterns within industries brought about by technological change and job restructuring strategies of corporations.[46] These projected changes in the occupational composition of employment and changes in job duties within occupations will likely raise the demand for higher order literacy proficiencies by employers.[47]

The IALS background questionnaire collected information on the occupational duties and titles of the main jobs held by employed respondents in the prior calendar year. The occupational information was used by researchers to assign an occupational code to each job using the International Standard Occupational Classification System (ISOC).[48] The individual ISOC occupations have been clustered into seven major categories, ranging from professional/ managerial occupations to laborer/helper/farm/forestry/fishing occupations. For U.S. workers in each of these seven occupational clusters, we have estimated their mean prose, document, quantitative, and composite proficiency scores, identified the percentile ranks associated with these mean scores on the international literacy distribution for 20 high-income countries and identified the U.S. ranking for each major occupational group among 19 high-income countries.

One would expect that the mean literacy proficiencies of U.S. workers in these seven occupational clusters would vary to some degree given substantive differences in the average educational backgrounds of the workers in these jobs and large differences in mean literacy proficiencies of workers by educational attainment. For example, in 1992, the percent of the employed (age 16 and older) in nine major occupational groups in the United States (based on U.S. Census Bureau occupational codes) who held an associate's or higher degree ranked from lows of only 7% in laborer/helper/cleaner and machine operator/fabricator occupations to 44 percent for those in technical occupations and to a high of 82% for those in professional occupations (Figure 8). Those employed in professional occupations at the time of the NALS survey had the highest mean prose, document, and quantitative proficiencies while machine operators/fabricators and laborers/helpers were characterized by the lowest mean proficiencies on each of these three scales.[49] The size of the gaps between the mean proficiencies of these occupational groups was quite substantial on each of the three scales, typically ranging from 78 to 80 points, or more than one full standard deviation.

---

43 We distinguish high level sales from lower level sales occupations.The high level sales positions include account representatives, financial service representatives, buyers, and stock and commodity brokers.The lower level sales positions include cashiers, sales clerks, newspaper vendors, etc.There are large differences in educational attainment and earnings of these two groups of workers.

44 Employment of technical workers rose by only 2.5% over this period, a rate of growth well below the 14% growth rate for all occupations.

45 These employment estimates for calendar year 2000 were based on the CPS household survey prior to the benchmarking of the employment estimates to the 2000 Census population totals.

46 For the BLS projections of national employment by occupation through 2010, see: Daniel Hecker, "Occupational Employment Projections to 2010," *Monthly Labor Review*, November 2001, pp. 57-84.

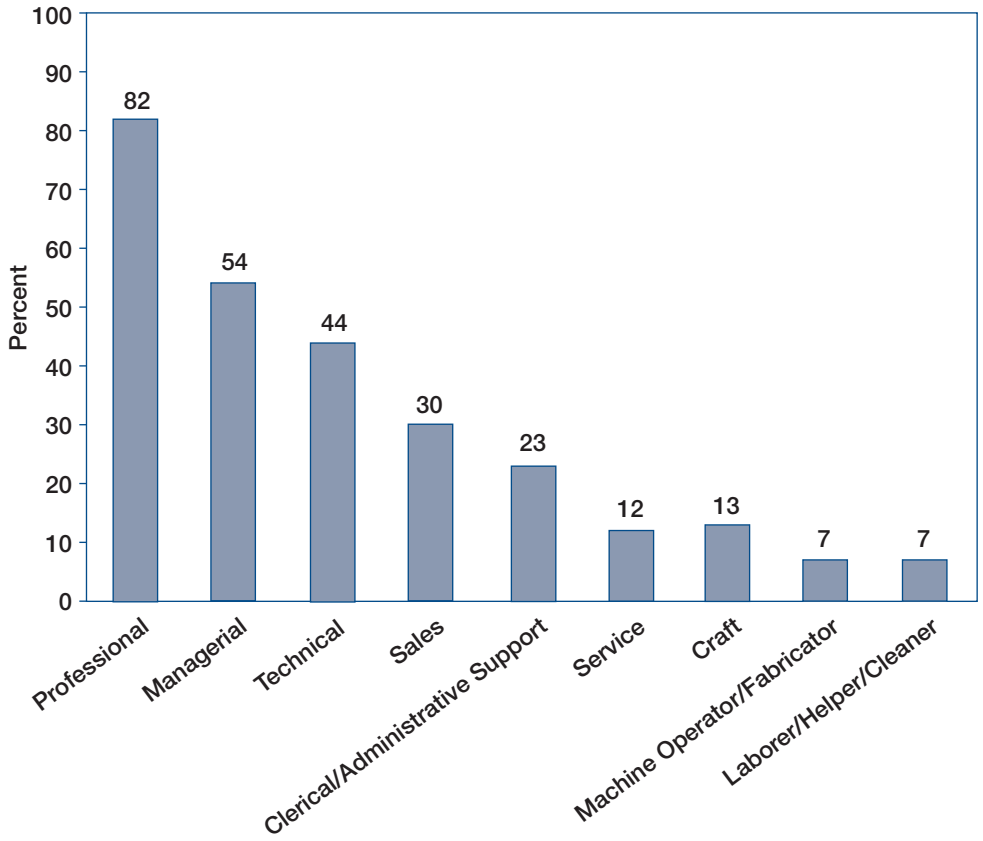
47 For an earlier analysis of the literacy impacts of changing occupational employment in the United States during the 1990s, See: Andrew Sum, *Literacy in the Labor Force*, 1999, especially Chapter 3.

48 For a review of the IALS procedures used to code the industry and occupation of the jobs held by the employed, see: OECD and Statistics Canada, *Literacy in the Information Age*, 2000, pp. 116-117.

49 See: Andrew Sum, *Literacy in the Labor Force*, 1999, Chapter 3.

Figure 8:

Percentage of U.S. Employed Adults in Major Occupational Groups with an Associate's or Higher Degree



Source: Current Population Surveys, March 1992.

The findings of the IALS assessment with respect to the mean prose scores of the employed (age 16 to 65) in the United States by major ISCO occupational group are displayed in Table 14. These mean prose scores ranged in value from a low of 242 for laborers and farm/fishing workers to highs of 313 for technical/paraprofessionals and 316 for workers in professional and managerial occupations. The percentile rankings of these mean scores on the international prose skills distribution for high-income countries ranged from lows at the 30th to 31st percentiles for workers in blue collar occupations to highs at the 76th and 77th percentiles for U.S. workers in technical/paraprofessional and managerial/professional occupations. The mean prose scores of U.S. workers in the latter two occupational clusters ranked second and third highest, respectively, among 19 high-income countries, while service/lower level sales and blue collar workers ranked near the bottom of the international distribution in 15th to 16th place. The absolute and comparative prose proficiencies of U.S. workers clearly varied quite dramatically by major occupational group.

Table 14:

Mean Prose Proficiencies of Employed U.S. Adults and Their Percentile Ranks on the International Prose Distribution, by Major Occupational Group

Occupational Group	Mean Score	Percentile Rank on International Scale	U.S. Rank Among 19 High-income Countries
Managers and professionals	316	77th	3rd
Technical and associated professionals	313	76th	2nd
Clerical and administrative support	291	62nd	10th
Service and lower level sales	269	46th	15th
Craft workers	245	31st	16th
Assemblers, operatives	244	31st	13th (tie)
Laborers and agricultural/fishery workers	242	30th	15th

Source: IALS Survey, 1994.

The estimated sizes of the gaps between the mean prose proficiency scores of U.S. managers/professionals and those of workers in the other six occupational clusters are displayed in Table 15. The size of these gaps ranged from a low of 2 points for technical/paraprofessional workers to more than 70 points for workers in the three blue collar sets of occupations, including skilled construction and craft workers.[50] These gaps in mean prose scores are particularly large in terms of standard deviation units. The mean prose score of professional/ managerial workers was nearly one full standard deviation above that of service and lower level sales workers and 1.4 to 1.5 standard deviations above those of all major groups of blue collar workers. These represent extraordinarily large differences between the proficiencies of the front line workers in most of the nation's key goods-producing industries and service/trade industries and those of higher level professional, managerial, and technical workers.

Table 15:

The Size of the Gaps Between the Mean Prose Proficiencies of U.S. Managers/Professionals and Other Occupational Groups, in Absolute Differences and in Standard Deviation Units

Occupational Group	Size of Gap	Gap in Standard Deviation Units
Technical and associated professionals	2	.04
Clerical and administrative support	24	.48
Service and lower level sales	47	.94
Craft workers	71	1.42
Assemblers and operatives	71	1.42
Laborers and agriculture/forestry/fishing	74	1.48

Note: Standard deviation units are measured relative to the 50 point standard deviation for professionals and managers in the United States.
Source: IALS Survey, 1994.

[50] The estimated two point gap between the mean prose scores of professionals/managers and those of technical/para-professional workers was not statistically significant.

Estimates of the mean document proficiencies of U.S. workers by major occupational group appear in Table 16. Here again, we find the mean document proficiencies to be highest among professionals and managers (311) and technical/paraprofessional workers (306) and lowest among skilled and semi-skilled blue collar workers (245 and 239, respectively). The percentile rankings of these mean document skills along the world document skills distribution for high-income countries were 74th and 71st for professionals/managers and technical/paraprofessional workers but only 31st for craft workers and 27th for blue collar operatives and fabricators. In comparison to the document proficiencies of their occupational counterparts in 19 high-income countries, technical and paraprofessional workers ranked sixth highest and managers and professionals ranked near the middle of the pack (8th highest); however, clerical, service/lower level sales, and skilled and semi-skilled blue collar workers ranked near the very bottom of the international skills distribution in 16th to 18th place.

Table 16:

Mean Document Proficiencies of Employed U.S. Adults and Their Percentile Rank on the International Document Distribution, by Major Occupational Group

Occupational Group	Mean Score	Percentile Rank on International Scale	U.S. Rank Among 19 High-Income Countries
Managers and professionals	311	74th	8th (tie)
Technical and associated professionals	306	71st	6th
Clerical and administrative support	287	57th	16th
Service and lower level sales	264	42nd	18th
Craft workers	245	31st	18th
Assemblers, operatives	239	27th	16th*
Laborers and farm/forestry/fishing	258	38th	9th (tie)

Note: *Data are only available for 18 countries for this occupational group.
Source: IALS Survey, 1994.

The size of the gaps between the mean document scores of professional/managerial workers and those of their employed U.S. counterparts in the six other occupational clusters are displayed in Table 17. The absolute size of these gaps ranged from 5 points for technical and paraprofessional workers to highs of 66 to 72 points for workers in craft and assembly/ operative/fabricator occupations. The mean document scores of the workers in professional/ managerial occupations were .9 standard deviations above those of workers in service/lower level sales occupations and 1.0 to 1.3 standard deviations above those of workers in each cluster of blue collar occupations. These very large gaps in document proficiencies between front-line workers and those in professional, managerial, and technical occupations make it more difficult to develop high-performance work organizations in which front line workers can assume greater responsibilities for planning and managing production-oriented tasks and engage in team work.

Table 17:

The Size of the Gaps Between the Mean Document Proficiencies of U.S.Managers/Professionals and Other Occupational Groups, in Absolute Differences and in Standard Deviation Units

Occupational Group	Size of Gap	Gap in Standard Deviation Units
Technical and associated professionals	5	.10
Clerical and administrative support	25	.47
Service and lower level sales	47	.91
Craft workers	66	1.27
Assemblers and operatives	72	1.38
Laborers and farm/forestry/fishing workers	53	1.02

Source: IALS Survey, 1994.

The mean quantitative proficiencies of U.S. workers in each major occupational cluster are presented in Table 18. The mean quantitative scores were highest among technical/para-professional workers (324) and professional/managerial workers (318) and lowest among blue collar assemblers/operators/fabricators (249). The percentile rankings on the world quantitative skills distribution associated with these mean scores varied from highs at the 79th percentile for technical/paraprofessional workers and the 76th percentile for professionals/managers to lows of the 30th to 35th percentiles for workers in the three blue collar occupational clusters. The mean quantitative score of U.S. workers in technical/paraprofessional occupations ranked second highest among 19 high-income countries while the mean score of professional/managerial workers ranked fifth highest among these 19 high-income countries. In sharp contrast, workers in service, craft, and operative/fabricator/assembler occupations ranked 16th, near the bottom of the distribution for the 19 high-income countries.

Table 18:

Mean Quantitative Proficiencies of Employed U.S. Adults and Their Percentile Ranks on the International Quantitative Distribution, by Major Occupational Group

Occupational Group	Mean Score	Percentile Rank on International Scale	U.S. Rank Among 19 High-Income Countries
Managers and professionals	318	76th	5th
Technical and associated professional workers	324	79th	2nd
Clerical and administrative support	287	55th	13th
Service and lower level sales	267	41st	16th
Craft workers	257	35th	16th*
Assemblers, operatives	249	30th	16th
Laborers and agricultural/forestry/ fishing workers	255	34th	13th

Note: *Data are only available for 18 countries in this occupational group.
Source: IALS Survey, 1994.

While the mean quantitative score of technical/paraprofessional workers slightly exceeded (by six points) that of managerial/professional workers, workers in the other five occupational groups obtained mean quantitative scores well below those of professional/managerial workers (Table 19). The size of these gaps in mean proficiency scores were quite large, being equal to approximately one full standard deviation for service and lower level sales workers and between 1.2 and 1.3 standard deviations for workers in the three clusters of blue collar occupations.

Thus, the analyses show that on all three literacy scales the scores of U.S. front-line workers fell considerably below those of their professional, managerial, and technical peers. These substantial literacy differences likely have contributed to the large earnings differentials that have prevailed among occupations in the United States in recent years.

Table 19:

The Size of the Gaps Between the Mean Quantitative Proficiencies of U.S. Managers/Professionals and Other Occupational Groups, in Absolute Differences and in Standard Deviation Units

Occupational Group	Size of Gap	Gap in Standard Deviation Units
Technical and associated professionals	-6	-.11
Clerical and administrative support	31	.59
Service and low level sales	51	.98
Craft workers	61	1.17
Assemblers and operatives	69	1.33
Laborers and agriculture/forestry/fishing	63	1.21

Note: Standard deviation units are measured relative to the 52-point standard deviation for professionals and managers in the United States.
Source: IALS Survey, 1994.

To explore these differences more fully, we estimated the mean composite proficiencies of U.S. workers in each major occupational cluster. Among U.S. workers, mean composite proficiency scores varied quite widely, ranging from highs of 315 to 316 for professionals/managers and technical workers to lows of 243 to 250 for workers in blue collar occupations (Table 20). When compared to the mean composite proficiencies of their peers in these 19 other high-income countries, we find that technical workers in the United States significantly outperformed their peers in these countries by 19 points while professional and managerial workers in the United States achieved a significantly higher mean composite score (8 points) than their counterparts in the other countries. Administrative support/clerical workers, fabricators and machine operators, and laborers/helpers/farm/forestry workers achieved mean quantitative scores that were statistically identical to those of their counterparts in the other high-income countries. On the other hand, service workers and lower level sales workers and craft workers in the United States obtained mean quantitative scores that were 11 to 13 points below those of their counterparts in the same occupations in the other countries. Both of these differences were statistically significant at the .05 level (Table 20).

Table 20:

Comparisons of the Mean Composite Proficiencies of the Employed by Major Occupational Groups in the United States and 19 Other High-Income Countries

Occupational Group	U.S.	19 Other High-Income Countries	U.S. – 19 Other Countries	Significance of Difference
Professional and managerial	315	307	+8	.01
Technical and paraprofessional	316	297	+19	.01
Clerical and administrative support	288	286	+2	--
Laborer, helper, agricultural and fishing	251	243	+8	--
Service workers and lower level sales	266	277	-11	.05
Craft and related workers	250	263	-13	.05
Assemblers, fabricators, machine operators	243	249	-6	--

Note: -- indicates that the difference between the two sample means was not statistically significant at the .05 level.
Source: IALS Survey, 1994.

Given the fact that U.S. workers in technical, professional, and managerial occupations achieved significantly higher composite scores than their counterparts in other high-income countries while workers in the other major occupational clusters either only matched or performed more poorly than their occupational counterparts in these other high-income countries, the sizes of the mean composite proficiency gaps between professional/managerial workers and front line workers in the United States are typically greater than those found in the other high-income countries (Table 21). The size of these mean composite proficiency gaps in the United States were 13 to 21 points larger than they were in the 19 other high-income countries for assemblers/fabricators/operatives, service workers, and craft workers. The considerably weaker absolute and comparative composite proficiencies of the nation's front-line workers generate a number of labor market problems. They create greater difficulties for front-line workers in adapting to technological change and acquiring more of the core skills demanded by the "New Economy," including computer-related and quality control skills.[51] These greater proficiency gaps make it more difficult for front-line workers to transition into higher skilled occupations, reducing the potential supply of skilled labor and contributing to higher wage and income inequality in the United States.[52]

The findings of the NALS survey also revealed the existence of large differences in the mean proficiencies of the employed by major occupational category. The mean prose, document, and quantitative proficiencies of professional workers typically exceeded those of workers in service, craft, semi-skilled blue collar, fabricator and operative, and laborer/helper occupations by at least one full standard deviation.[53] The likelihood of a worker gaining access to jobs in professional, managerial, and technical occupations was substantially influenced by both his/her educational attainment and literacy proficiencies.

Table 21:

Size of the Gaps Between the Mean Composite Proficiency Scores of Professional/Managerial Workers and Those of Workers in Other Occupations in the United States and 19 Other High-Income Countries

Occupational Groups	U.S.	19 Other High-Income Countries	Difference Between U.S. and 19 Other Countries
Technical and paraprofessional	-1	10	-11
Clerical and administrative support	26	21	+5
Service workers/lower level sales	49	30	+19
Craft workers	65	44	+21
Assemblers, fabricators, operatives	71	58	+13
Laborer, helper, cleaner, farm, forestry	64	64	+0

Source: IALS Survey, 1994.

[51] See: John Comings, Andrew Sum, Johan Uvin, et al., *New Skills for A New Economy: Adult Education's Role in Sustaining Economic Growth and Expanding Opportunity*, Massachusetts Institute for A New Commonwealth, Boston, 2001.

[52] For a review of wage inequality differences in the U.S. and other OECD countries, see: (i) Richard B. Freeman and Lawrence Katz, "Rising Wage Inequality: The U.S. Versus Other Advanced Countries," in *Working Under Different Rules*, Russell Sage Foundation, New York, 1996; (ii) OECD and Statistics Canada, *Literacy in the Information Age*, 2000, (iii) Devroye and Freeman, 2000.

[53] See: Andrew Sum, *Literacy in the Labor Force*, 1999, Chapter 3.

To illustrate the nature of these relationships, we calculated the share of workers in selected educational attainment and prose proficiency groups who were employed in professional, managerial, or technical occupations at the time of the NALS survey. The ability of U.S. workers to obtain employment in professional, managerial, and technical occupations rose uniformly and strongly with both their formal educational attainment and their prose proficiencies. Only 4% of the employed with some high school schooling but no regular diploma or GED certificate were able to gain access to professional, managerial or technical occupations versus 22% of those with one or more years of college, 38% of those with an associate's degree, and 71% of those with a bachelor's or higher degree. The likelihood of being employed in such high level, white-collar occupations also rose strongly with the prose proficiencies of workers, increasing from only 5% among those with a Level 1 proficiency to 26% for those with a Level 3 proficiency and to a high of 72% for those with a Level 5 prose proficiency (Table 22).

Within each educational attainment category, the ability of the employed to secure professional, managerial, or technical employment tended to increase with their prose proficiency level. For example, among high school graduates, the percent of workers holding jobs in such occupations increased from 6% for those in proficiency Level 1 to 15% of those in proficiency Level 5. Among those workers with an associate's degree, the share employed in such occupations rose from 28 - 29% for those in proficiency Levels 1 and 2 to 40 - 43% for those in proficiency Level 4 or 5. Finally, among those with a bachelor's or higher academic degree, the percent employed in professional, managerial, and technical occupations increased from only 46% among those in Level 1 to 64% among those in Level 3 to a high of 83% for those in proficiency Level 5. Clearly then, both formal schooling and literacy proficiencies contributed strongly and independently to the likelihood of professional/managerial/technical employment among U.S. workers in the early 1990s.

Table 22:

Percentage of Employed U.S. Adults (Age 16 and Older) with Specified Educational Attainment and Prose Proficiency Levels Who Were Able to Obtain Employment in Professional, Managerial, or Technical Occupations

Educational Attainment	Level 1	Level 2	Level 3	Level 4	Level 5	Overall
0 to 8 years	2	6	6	39	--	3
9 to 12 years, no diploma	2	7	6	11	--	4
High school diploma or GED	6	9	10	12	15	9
Some postsecondary, no degree	9	17	21	29	44	22
Two-year degree	28	29	37	43	40	38
Four-year degree or higher	46	56	64	75	83	71
All workers	5	14	26	50	72	27

Note: -- indicates that the number of cases is too small to provide reliable estimates.
Source: NALS Survey, 1992; tabulations by the authors.

Class of Worker and Supervisory Responsibilities of Jobs Held by the Employed

For the main job that they held in the prior year, employed respondents to the IALS survey were asked to describe their class of worker status and their supervisory responsibilities if any.[54] Jobs were assigned into one of three categories: wage and salary jobs, self-employment, and unpaid family workers. Those holding wage and salary jobs were classified into one of three categories based on their supervisory responsibilities: none, limited, or extensive. The percentage distributions of the employed by class of worker/supervisory responsibilities and by their proficiency level on the composite skills distribution are presented in Table 23. Since unpaid family workers accounted for less than one percent of the total number of employed, they have been excluded from the table.

Overall, slightly over 90% of the employed were classified as wage and salary workers, a little over 9% were categorized as self-employed, and only .2% were unpaid family workers. Among the employed, the share who were wage and salary workers with some supervisory responsibilities varied fairly considerably by proficiency level on the composite skills distribution. The share of the employed with some supervisory responsibilities ranged from a low of 23% among those in proficiency Level 1 to a high of over 44% for those in the top two proficiency levels (Figure 9). [55] Those wage and salary workers in the two highest proficiency levels were significantly more likely than their less literate counterparts to have reported some supervisory responsibilities on their jobs. Workers with composite proficiencies in Level 4 or 5 were twice as likely as those in Levels 1 and 2 to have reported extensive supervisory responsibilities on their jobs.

Self-employment tended to rise modestly with the composite proficiency levels of the employed (Table 23). About 8% of the employed in proficiency Level 1 were self-employed versus 9% of those in Levels 2 and 3 and 11% of those in the two highest proficiency levels. However, only the difference in self-employment rates between those in proficiency Level 4 or 5 and those in proficiency Level 1 was statistically significant (.05 level).

Table 23:

Percentage Distribution of Employed U.S. Adults (Age 16 to 65), by Their Class of Worker and Supervisory Responsibilities on Their Main Job and by Composite Proficiency Level

Type of Job	Level 1	Level 2	Level 3	Level 4 or 5	Overall
Wage and salary job, no supervisory responsibility	69	60	54	44	56
Wage and salary job, limited supervisory responsibility	13	21	23	26	22
Wage and salary job, extensive supervisory responsibility	10	10	14	18	13
Self-employed	8	9	9	11	9

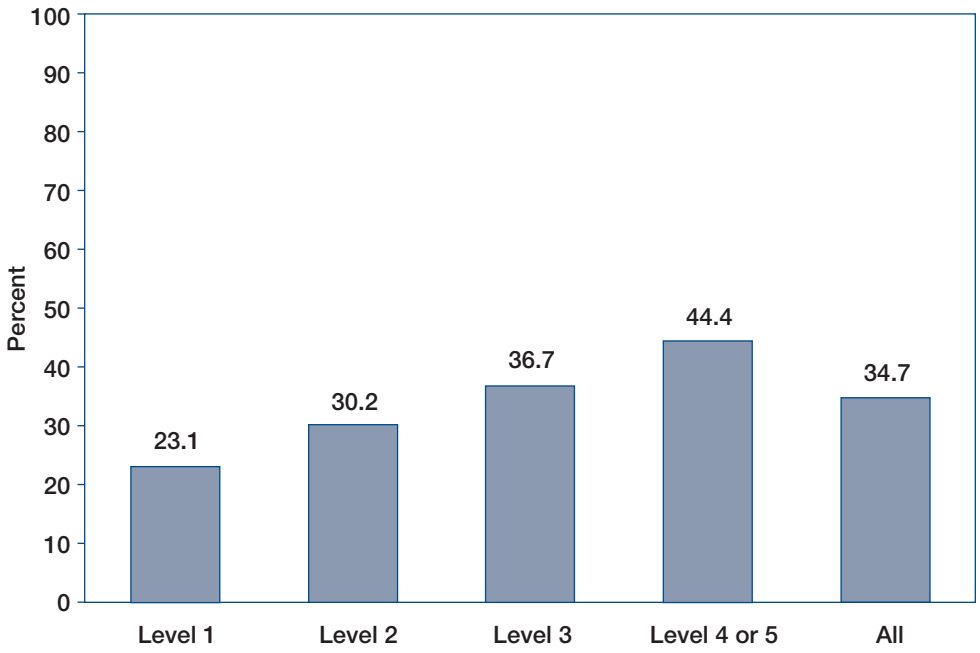
Source: IALS Survey, 1994.

[54] The "main job" is the job that accounted for the greatest number of weeks worked over the previous 52 weeks.

[55] There clearly appears to be some exaggeration in supervisory responsibilities among employed respondents. Nearly 4 in 10 wage and salary workers reported some supervisory responsibilities. Nearly everyone in the U.S. is a "manager."

Figure 9:

Percentage of Employed U.S. Adults (Age 16 to 65) with Some Supervisory Responsibilities on the Main Job Last Year, by Composite Proficiency Level



Source: IALS Survey, 1994.

The Literacy Proficiencies of the Employed and Their Weekly and Annual Earnings

Among the most important labor market outcomes for workers are the weekly and annual earnings that are generated by their employment. Given its much larger number of sample observations and the much richer nature of its weekly and annual earnings data, the NALS survey data will be primarily relied upon to analyze the relationships between earning outcomes and the literacy proficiencies of U.S. workers.[56] The IALS data on annual earning categories and annual earnings data from the National Longitudinal Survey of Youth (NLSY) will be used to supplement the findings from the NALS survey.[57]

The NALS survey collected data on the hourly/weekly earnings of all persons age 16 and older who were employed at the time of the survey. Our analysis of the weekly earnings data is confined to those persons who were employed full-time; i.e., working 35 or more hours per week. Estimates of the mean weekly earnings of the full-time employed by proficiency level on the prose, document, and quantitative scales are displayed in Table 24. Overall, mean weekly earnings (in 1992) were $546. On each of the three scales, the mean weekly earnings of the full-time employed rose steadily and strongly with their proficiency level. For example, on the prose scale, mean weekly earnings increased from a low of $355 for those in proficiency

[56] For a more detailed review of findings from the NALS survey on the weekly and annual earnings of employed adults in the U.S. and their literacy proficiencies, including the results of an array of multivariate statistical models, see: (i) Andrew M. Sum, *Literacy in the Labor Force*, 1999, especially Chapters 4 and 7; (ii) Dan Devroye and Richard Freeman, *Does Inequality in Skills Explain Inequality of Earnings Across Countries*?, Harvard University, Cambridge, May 2000.

[57] The IALS survey collected more limited earnings data than NALS, and the data were re-coded into earnings categories rather than maintained in continuous form, thereby limiting the types of analyses that can be performed. See: OECD and Statistics Canada, *Literacy in the Information Age*, 2000.

Level 1 to $531 for those in proficiency Level 3 and to a high of $910 for those in the top proficiency level. Those workers in proficiency Level 5 obtained mean weekly earnings that were 2.6 times as high as those of workers in proficiency Level 1. Very similar earnings gaps prevailed on the quantitative scale (Table 24 and Figure 10). Mean weekly earnings ranged from a low of only $330 for those in quantitative proficiency Level 1 to a high of $913 for those in the top proficiency level. The mean weekly earnings of the full-time employed in proficiency Level 5 were 2.8 times as high as those of their counterparts in proficiency Level 1.

Table 24:

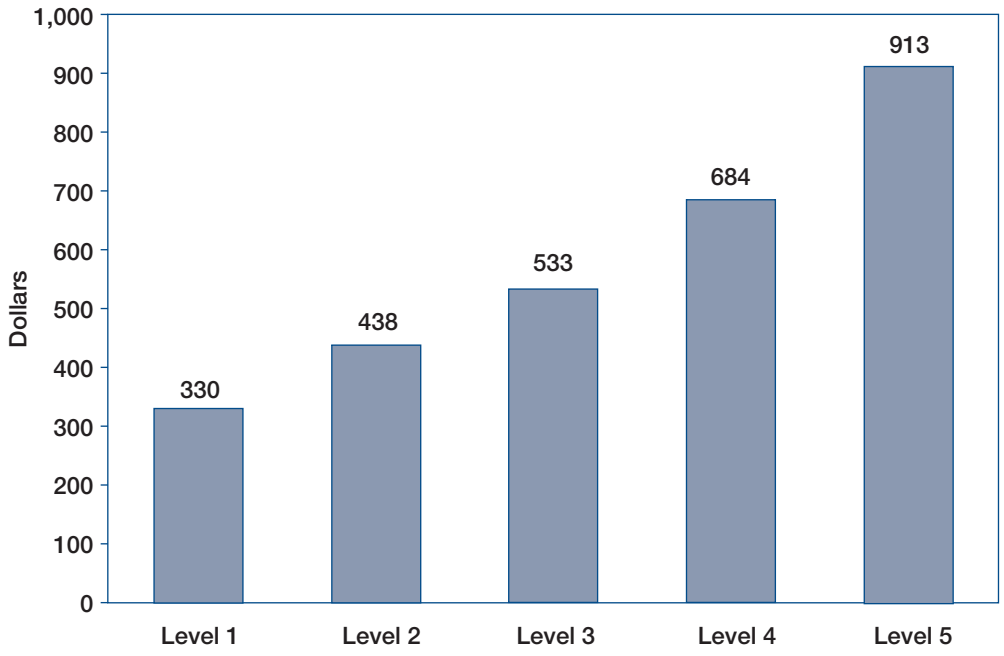
Mean Weekly Earnings of U.S. Full-Time Employed, by Proficiency Level on Each Literacy Scale

Literacy Scale	Level 1	Level 2	Level 3	Level 4	Level 5	Overall
Prose	$355	$436	$531	$709	$910	$546
Document	355	458	553	710	807	546
Quantitative	330	438	533	684	913	546

Source: NALS Survey, 1992.

Figure 10:

Mean Weekly Earnings of U.S. Full-Time Employed, by Quantitative Proficiency Level



Source: NALS Survey, 1992.

Strong links between the literacy proficiencies of workers and their weekly earnings prevailed for men and women and for Black, Hispanic, and White workers. For both men and women, mean weekly earnings of the full-time employed rose continuously and sharply with their prose proficiencies (Table 25). [58] Among women, mean weekly earnings increased from just $272 among those in proficiency Level 1 to $411 for those with a mid-level proficiency to a high of $716 for those in proficiency Level 5 (Table 25). Full-time employed women in the top prose proficiency category achieved mean weekly earnings that were 2.6 times as high as those of their female counterparts in prose proficiency Level 1. A similar relative weekly earnings difference (2.7 times) between the top and bottom proficiency category prevailed among men. Stronger prose and quantitative proficiencies among adults were associated with both a much higher likelihood of full-time employment and substantially higher weekly earnings when employed.[59]

Some reviewers of the findings on the links between weekly earnings and literacy proficiencies have assumed that the higher mean weekly earnings of workers with stronger prose proficiencies primarily reflect their higher levels of formal schooling. It is certainly true that those workers with superior prose proficiencies have, on average, completed more years of schooling, but, as we have revealed elsewhere, part of their higher educational attainment is undoubtedly attributable to their stronger literary proficiencies.[60] Longitudinal studies of the educational experiences of adolescents reveal that those youth who had stronger academic achievement test scores in their high school years were more likely to graduate from high school, attend college after graduation from high school, complete more years of college, and obtain more post-secondary degrees.[61]

Table 25:

Mean Weekly Earnings of U.S. Full-Time Employed Men and Women (Age 16 and Older), by Prose Proficiency Level

Group	Level 1	Level 2	Level 3	Level 4	Level 5	Overall
Men	$391	$507	$623	$830	$1,041	$629
Women	272	336	411	548	716	428

Source: NALS Survey, 1992; Andrew Sum, *Literacy in the Labor Force*, 1999.

58 Findings of multiple regression analyses of the weekly and annual earnings of workers revealed that the composite proficiencies were a better predictor of earnings than each of the three scales by themselves. A one standard deviation increase in composite proficiencies, *ceteris paribus*, would raise expected weekly earnings by about 14%.

59 Full-time employment/population ratios for the working-age population ranged from a low of 30% among those with a level one prose proficiency to 54% for those with a mid-level proficiency to a high of 71% for those in proficiency Level 5.

60 Since the NALS survey is a cross-sectional rather than a longitudinal survey, we cannot show how educational attainment over time changes in response to pre-existing higher literacy proficiencies. Cross-sectional regressions of educational attainment revealed that literacy proficiencies had strong statistically significant impacts on the educational attainment of non-elderly NALS respondents. See: Andrew Sum, *Literacy in the Labor Force*, 1999, Chapter 5.

61 For a review of a number of such studies, see: (i) Susan E. Mayer and Paul Peterson (Editors), *Earning and Learning*, the Brookings Institution, Washington, D.C., 1999; (ii) Andrew Sum, *Literacy in the Labor Force,* 1999, Chapter 5; (iii) Paula Knepper, *Student Progress in College. NLS Post-Secondary Education Transcript Study: 1984*, U.S. Department of Education, Washington, D.C., 1989.

The mean weekly earnings of full-time workers in the United States are influenced by both their educational attainment and their literacy proficiencies.[62] Table 26 presents estimates of the mean weekly earnings of full-time workers in the United States at the time of the NALS survey by their educational attainment and their prose proficiency level. Mean weekly earnings of those workers rose consistently and sharply with their educational attainment. These mean weekly earnings increased from $313 for those with only a primary school education to $430 for those with a regular high school diploma or GED certificate to $574 for those holding an associate's degree and to a high of $830 for those with a bachelor's or higher degree. Within every educational group, mean weekly earnings of the employed also increased with their prose proficiency level. For example, among high school graduates, mean weekly earnings rose from $369 for those in prose proficiency Level 1 to $493 for those with a Level 4 proficiency. Among associate degree holders, mean weekly earnings increased from $386 for those with a Level 1 proficiency to $630 for those with a Level 5 proficiency. Among four-year college graduates and those with more advanced degrees, mean weekly earnings also rose steadily and strongly with their prose proficiency, increasing from a low of $586 to a high of $993. As workers obtained both more schooling and stronger prose proficiencies, their weekly earnings rose strongly (Figure 11).

Table 26:

Mean Weekly Earnings of U.S. Full-Time Employed Adults (Age 16 and Older) by Prose Proficiency Level and Educational Attainment

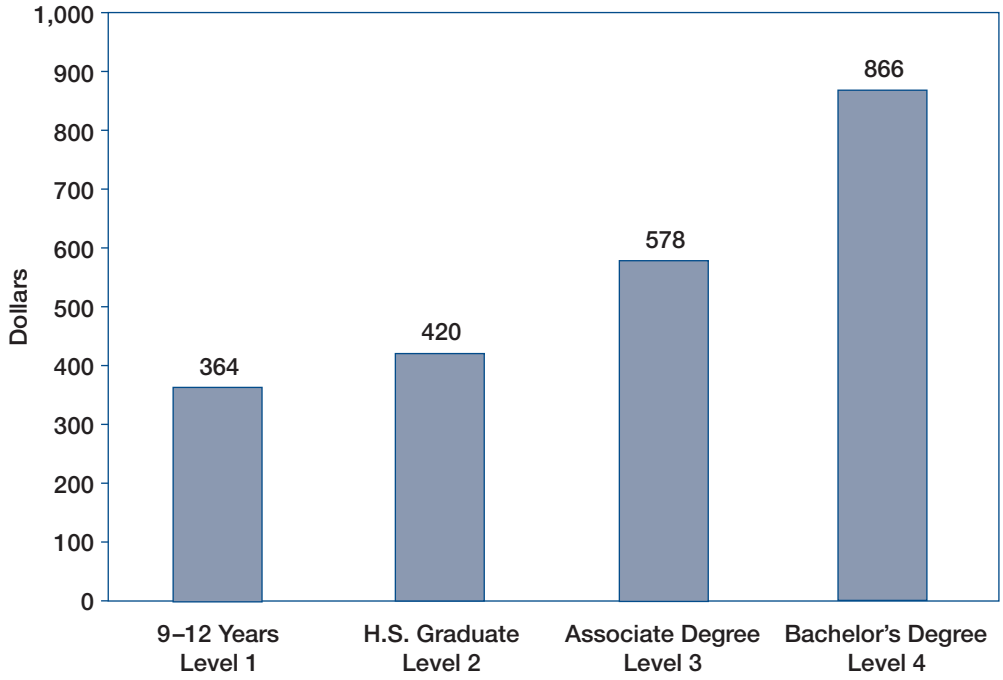
Educational Attainment	Level 1	Level 2	Level 3	Level 4	Level 5	Overall
0 to 8 years	$298	$351	--	--	--	$313
9 to 12 years	364	357	414	--	--	373
GED	333	364	489	529	--	431
High school diploma	369	420	436	493	--	430
Some postsecondary	367	455	491	597	--	509
Two year degree	386	504	578	610	630	574
Four year degree or higher	586	677	739	866	993	830

Note: -- indicates that the number of cases is too small to provide reliable estimates.
Source: NALS Survey, 1992.

[62] Findings of more sophisticated multivariate statistical analyses based on human capital earnings functions reveal that a one standard deviation increase in composite proficiencies, *ceteris paribus*, will raise expected weekly earnings by 14 to 15%. See: Andrew Sum, *Literacy in the Labor Force*, 1999, Chapter 7.

Figure 11:

Mean Weekly Earnings of U.S. Full-Time Employed in Selected Educational Attainment and Prose Proficiency Groups



Source: NALS Survey, 1992.

The Literacy Proficiencies of Workers and Their Annual Earnings

The NALS survey collected data on the number of weeks that respondents were employed in the prior 52-week period, the average number of hours worked per week, and their average hourly or weekly earnings. The values for each of these three variables were combined to generate estimates of the gross annual earnings of the employed in the 52-week period prior to the survey.[63] Estimates of the mean annual earnings of all persons employed in the prior year by proficiency level on each of the three literacy scales are displayed in Table 27.

The mean annual earnings of all employed persons (including part-time and part-year workers) were slightly under $21,000. On each of the three literacy scales, the mean earnings of the employed increased steadily and steeply by proficiency level. On the prose scale, the mean annual earnings rose from $13,260 for those in proficiency Level 1 to nearly $21,000 for those with a mid-level proficiency to a high of $40,050 for those workers in prose proficiency Level 5 (Figure 12). The mean annual earnings of workers with the strongest prose proficiencies were three times higher than those of their peers with the weakest prose proficiencies. Very similar patterns prevailed on the quantitative scale. The mean annual earnings of the employed ranged from a low of only $12,000 for those with a Level 1 proficiency in quantitative skills to $20,600 for those with mid-level proficiencies and to a high of $39,190 for those workers with a Level 5 proficiency. The mean annual earnings of workers with the strongest quantitative proficiencies were nearly 3.3 times as high as those of their counterparts with the weakest quantitative proficiencies.

[63] These annual earnings estimates are measured pre-tax and before any other payroll deductions.They exclude executive/management bonuses and stock options.

Table 27:

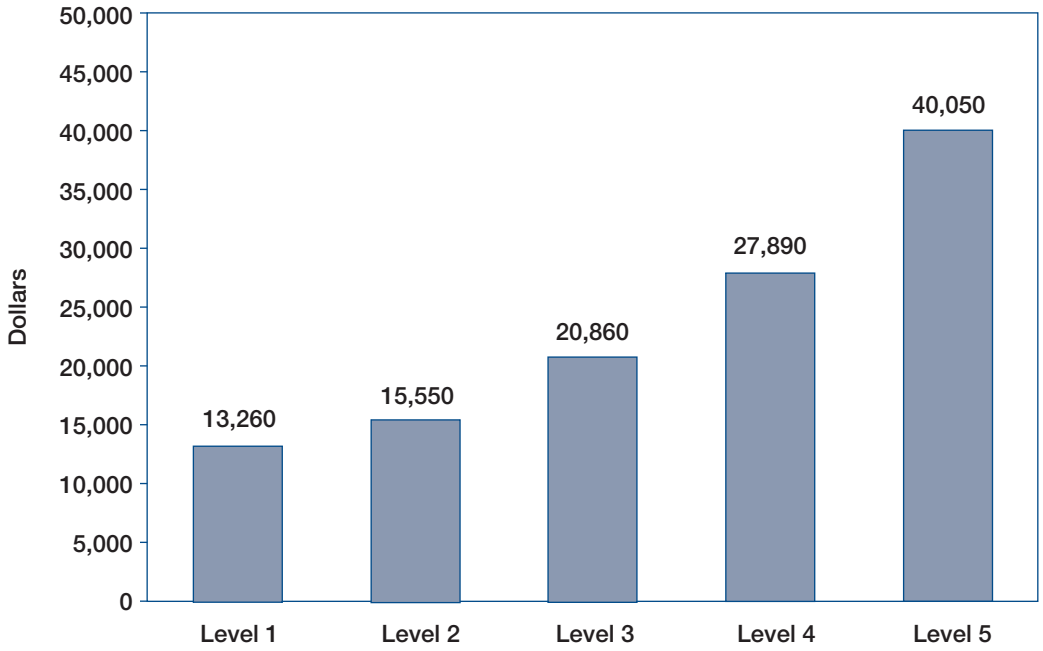
Mean Annual Earnings of the U.S.Employed, by Proficiency Level on Each Literacy Scale

Literacy Scale	Level 1	Level 2	Level 3	Level 4	Level 5	Overall
Prose	$13,260	$15,550	$20,860	$27,890	$40,050	$20,920
Document	13,110	17,110	21,410	28,610	33,600	20,920
Quantitative	12,020	15,560	20,620	28,610	39,190	20,920

Source: NALS Survey, 1992; Andrew Sum, *Literacy in the Labor Force*, 1999.

Figure 12:

Mean Annual Earnings of the U.S. Employed, by Prose Proficiency Level



Source: NALS Survey, 1992; Andrew Sum, *Literacy in the Labor Force*, 1999.

The annual earnings advantages of the more literate workers in the United States reflect a combination of more weeks and hours of employment during the year and higher earnings per hour of employment. The higher mean annual hours of work among the more literate are attributable to their higher rates of labor force participation, their lower rates of unemployment when they do seek work, and their reduced incidence of under-employment problems; i.e., working fewer hours than desired due to slack economic conditions in the firm or an inability to find full-time work.

The annual earnings data from the NALS survey can be combined with the data on the educational attainment and literacy proficiencies of the employed to illustrate how annual earnings vary with their level of schooling and quantitative literacy proficiencies.[64] In Table 28, we have categorized the employed into 35 subgroups based on education and quantitative proficiency and estimated the mean annual earnings for each of these subgroups of workers. Persons not employed in the 52-week period prior to the survey were excluded from the analysis.

The annual earnings of workers in every educational subgroup, except those with 9-12 years of schooling but no diploma, rose steadily and strongly with their level of quantitative proficiency.[65] For example, among high school graduates mean annual earnings increased from a low of $13,350 among those in proficiency Level 1 to $18,000 for those in proficiency Level 3 and to a high of just under $28,000 for those in the highest quantitative proficiency level. Similar strong links between quantitative proficiencies and mean annual earnings also prevailed among workers with an associate's, bachelor's, or higher academic degree. Among workers holding a bachelor's or higher degree, mean annual earnings rose from a low of $22,750 for those in Level 1 to nearly $32,000 for those in Level 3 and to a high of $47,170 for those in Level 5 (see Figure 13 and Table 28). Those college graduates who left college with a strong base of literacy and quantitative proficiencies achieved superior earnings from their labor market experiences.

Table 28:

Mean Annual Earnings of Employed U.S. Adults, by Quantitative Proficiency Level and Educational Attainment

Educational Attainment	Level 1	Level 2	Level 3	Level 4	Level 5	Overall
0 to 8 years	$10,610	$11,370	$11,750	--	--	$13,120
9 to 12 years, no diploma*	10,430	10,940	10,390	8,460	--	10,440
GED	12,300	13,340	16,780	18,760	--	15,070
High school diploma, no college	13,350	15,140	17,990	20,350	27,880	16,840
Some post-secondary	14,220	17,070	18,730	23,550	23,620	19,380
Two year degree	13,900	18,420	21,420	23,040	24,150	21,410
Four year degree or higher	22,750	28,130	31,750	38,100	47,170	36,370

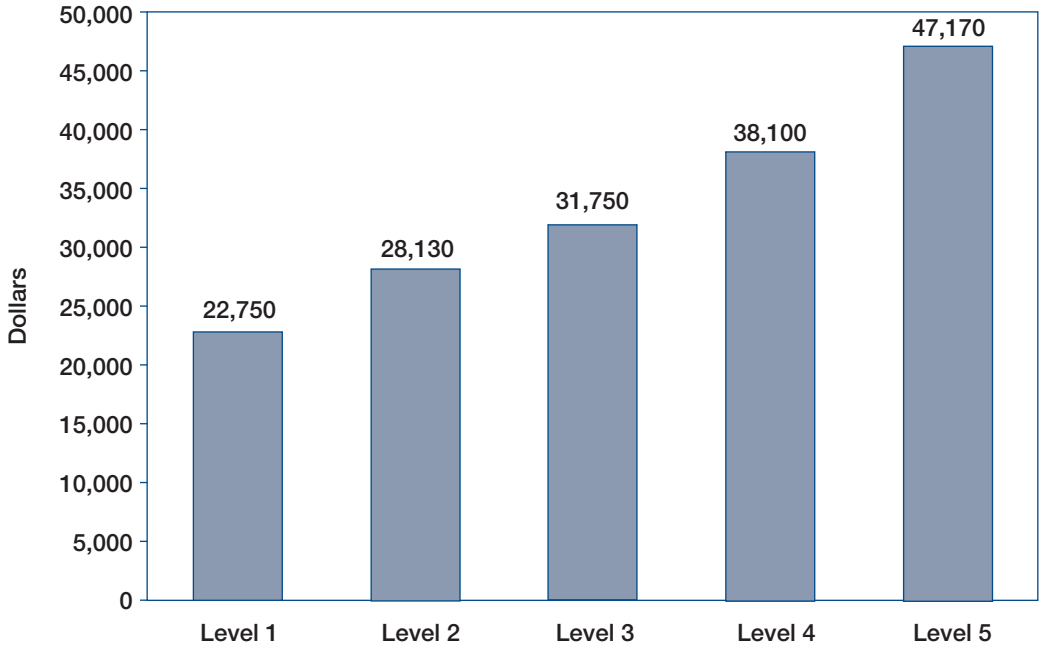
Note: -- indicates that the number of cases is too small to provide reliable estimates.
* this group of employed includes students still enrolled in high school.
Source: NALS Survey, 1992.

64 The annual earnings of workers are influenced by their weeks and hours of employment during the year as well as by their average hourly or weekly wages. Stronger quantitative proficiencies tend to raise annual hours of work as well as generate higher weekly wages.

65 The lack of any relationship between quantitative proficiencies and the annual earnings of those workers lacking a high school diploma is largely attributable to the presence of high school students in the data. Excluding high school students tends to produce higher mean earnings for dropouts with stronger quantitative proficiencies.

Figure 13:

Mean Annual Earnings of Employed U.S. Adults with a Bachelor's or Higher Degree, by Quantitative Proficiency Level



Source: NALS Survey, 1992.

While the IALS survey in the United States did collect some earnings data from employed respondents, OECD research members did not code the earnings data in a continuous form. Instead, an independent source of data on the distribution of annual earnings of U.S. workers was used to identify quintile boundaries of this earnings distribution, and workers in the IALS survey were assigned to the quintile in which their earnings level fell.[66] We have estimated the percentage distribution of U.S. workers who were employed full-time for 40 or more weeks by quintile of this earnings distribution.[67] Findings are presented in Table 29 for all of the employed meeting the weeks and hours of work criteria as well as by proficiency level on the composite skills distribution.

[66] The national database and methods used to compute the earnings cutoffs for each quintile of the distribution in the U.S. were not made clear by OECD. It is likely that the March CPS work experience survey was the database used to construct these estimates.

[67] It should be noted that these workers are not distributed evenly by quintile of this independent earnings distribution. Workers are under-represented in the lowest and highest quintile and over-represented in quintiles two and three.

Table 29:

Percentage of Employed U.S. Adults Working Full-Time for 40 or More Weeks with Annual Earnings in Selected Categories, by Composite Proficiency Level

Earnings Category	Level 1	Level 2	Level 3	Level 4 or 5	Overall
Lowest	40.9	18.4	9.6	7.6	15.8
Second Lowest	35.0	37.5	25.4	18.6	27.7
Middle	19.3	28.8	32.0	28.7	28.4
Second Highest	4.1	13.3	24.6	29.9	20.4
Highest	.7	2.1	8.4	15.2	7.7
Total	100.0	100.0	100.0	100.0	100.0

Source: IALS Survey, 1994; tabulations by the authors.

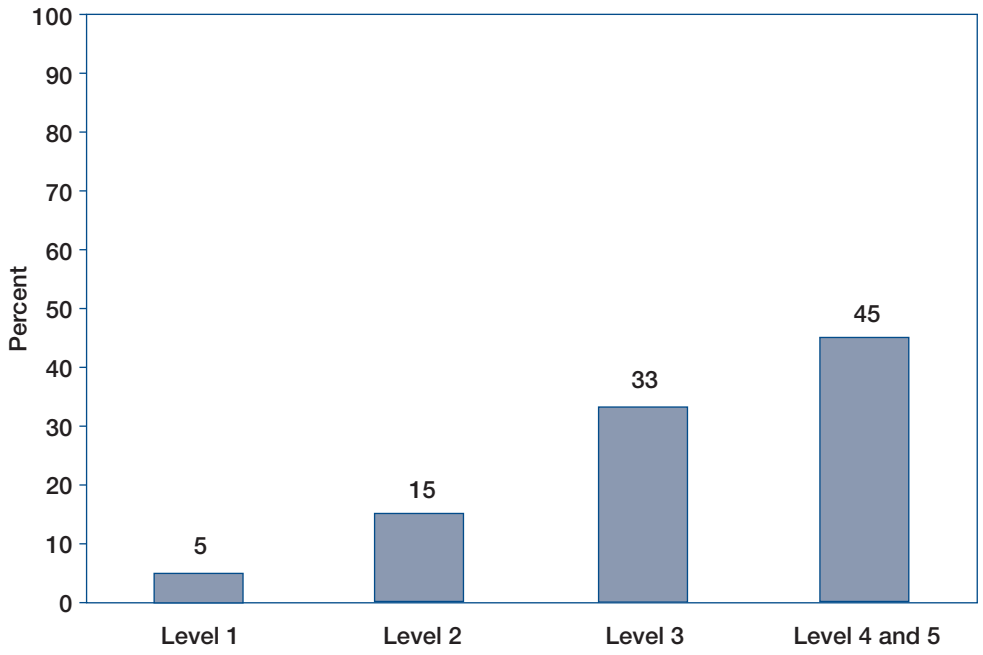
Workers with the lowest composite proficiencies were substantially concentrated in the two lowest earnings quintiles. Nearly 41% of the employed with a Level 1 composite proficiency fell in earnings quintile 1, and 76% of them fell in the two lowest earnings quintiles as did 56% of the employed with a Level 2 proficiency. In contrast, only 26% of those workers with a Level 4 or 5 proficiency had earnings in the bottom two quintiles.

Workers with a Level 4 or 5 composite skill proficiency were considerably more likely than their less literate counterparts to have achieved an earnings level that would place them in the two highest quintiles. About 45% of the workers in proficiency Level 4 or 5 achieved earnings in the top two quintiles versus only 5% of those in Level 1 and 15% of those in proficiency Level 2 (Table 29 and Figure 14). The most literate workers in the United States, thus, were nine times as likely as the least literate workers to have achieved a high earnings level. A multivariate statistical analysis of the earnings of workers in the United States and 19 other countries revealed that both formal educational attainment and literacy proficiencies had very strong independent effects on the earnings of U.S. workers.[68]

[68] See: OECD and Statistics Canada, *Literacy in the Information Age*, 2000, Chapter 4, pp. 75-79.

Figure 14:

Percentage of Employed U.S. Adults Working Full-Time for 40 or More Weeks with Annual Earnings in the Two Highest Quintiles, by Composite Proficiency Level



Source: IALS Survey, 1994.

Findings of other national surveys, including the National Longitudinal Survey of Youth (NLSY), also provide strong empirical evidence of the importance of both schooling and basic academic skills in determining the earnings of adults as they move through their 20s and 30s. The NLSY survey initially involved interviews with a nationally representative sample of some 12,600 youth beginning in 1979.[69] In 1980, each participant in the NLSY survey was administered the Armed Services Vocational Aptitude Battery (ASVAB), an aptitude test used by the nation's armed services to determine eligibility for service in the military.[70] A subset of the ASVAB test (sections covering vocabulary, reading comprehension, arithmetic reasoning, and arithmetic operations) is known as the Armed Forces Qualification Test or AFQT. We have analyzed the entire distribution of these AFQT test scores and assigned each NLSY youth to one of five quintiles in the distribution of those scores in 1980. These NLSY youth have been tracked annually by the National Opinion Research Center for the U.S. Department of Labor, with annual data collected on their schooling, labor market, and earnings experiences. The mean annual earnings of these youth in 1997 (including those with no paid employment) are displayed in Tables 30 to 32 by their schooling level at the time of the 1998 survey and their AFQT test score performance. Table 30 provides the results for these 33 to 40 year old men and women combined while Tables 31 and 32 present the findings for men and women separately.[71]

[69] For a review of the purposes and design features of the NLSY survey, see: Michael E. Borus (Editor), *Youth and the Labor Market,* W.E. Upjohn Institute for Employment Research, Kalamazoo, 1987.

[70] For an overview of the ASVAB testing of youth as part of the NLSY survey and the construction and use of AFQT test scores, see: (i) Gordon Berlin and Andrew Sum, *Toward A More Perfect Union: Basic Skills, Poor Families, and Our Economic Future*, Ford Foundation, New York, 1989; (ii) Office of the Assistant Secretary of Defense, Department of Defense, *Profile of American Youth: 1980 Nationwide Administration of the Armed Services Vocational Aptitude Battery*, Washington, D.C., March 1982.

[71] These youth were 14-21 years old at the time of the initial NLSY survey in 1979. By 1998, these men and women were in the 33-40 age group.

Table 30:

Mean Annual Earnings of Men and Women (Ages 33 to 40), by Educational Attainment and AFQT Proficiency, 1997

	AFQT Quintile				
Educational Attainment	**Lowest**	**Second Lowest**	**Middle**	**Second Highest**	**Highest**
<12 Years	$11,465	$19,730	$21,140	--	--
12 Years	15,647	21,519	25,510	28,417	30,928
13 – 15 Years	19,622	22,427	27,775	27,398	35,894
16+ Years	25,682	31,716	37,752	41,318	52,828
Total	15,426	22,706	28,773	33,190	46,574

Note: -- indicates fewer than 20 cases in the cell.
Source: National Longitudinal Survey of Youth, 1998 interview.

The 1997 mean annual earnings of these 33 to 40 year old men and women varied quite widely by their AFQT test score performance.[72] The mean annual earnings of those persons in the lowest AFQT quintile were only $15,426 versus $28,773 for those in the middle quintile and a high of $46,574 for those in the top quintile. Those persons with top quintile skills obtained mean annual earnings that were three times as high as those of their peers in the bottom quintile of the AFQT test score distribution. Similar-sized relative earnings differentials between the top and bottom quintiles of the AFQT test score distribution prevailed among men and women (See Tables 31 and 32). These large earnings differences reflect a combination of more hours of paid employment and higher hourly earnings of the most literate adults during calendar year 1997.

Within each of the four educational groups appearing in Tables 30 to 32, annual earnings tend to rise strongly with AFQT score performance. For example, among high school graduates, mean annual earnings rose from $15,647 for those in the bottom quintile of the AFQT test score distribution to $25,510 for those with middle quintile skills and to a high of nearly $31,000 for those with top quintile skills. Those high school graduates with top quintile skills obtained mean earnings that were twice as high as those of their peers in the bottom quintile. A very similar pattern of earnings prevailed among those men and women holding a bachelor's or more advanced degree. The annual earning of college graduates with mid-level skills were approximately 50% higher than those with bottom quintile skills, and college graduates with top quintile skills achieved mean earnings twice as high as their counterparts with bottom quintile skills ($52,828 vs. $25,682). Strong basic academic proficiencies improved the annual earnings of both men and women in each educational attainment group, including high school dropouts (Tables 31 and 32).

[72] Non-earners are included in the data.Those persons with no paid employment during calendar year 1997 were assigned a value of zero for their earnings.

Table 31:

Mean Annual Earnings of Men (Ages 33 to 40), by Educational Attainment and AFQT Proficiency, 1997

	AFQT Quintile				
Educational Attainment	**Lowest**	**Second Lowest**	**Middle**	**Second Highest**	**Highest**
<12 Years	$16,311	$25,191	$27,707	--	--
12 Years	20,039	27,698	32,344	35,306	43,375
13 – 15 Years	25,795	28,733	37,198	36,371	44,655
16+ Years	30,722	42,880	49,339	53,342	69,438
Total	19,911	28,734	37,151	42,130	60,830

Note: -- indicates fewer than 20 cases in the cell.
Source: National Longitudinal Survey of Youth, 1998 interview.

Table 32:

Mean Annual Earnings of Women (Ages 33 to 40), by Educational Attainment and AFQT Proficiency, 1997

	AFQT Quintile				
Educational Attainment	**Lowest**	**Second Lowest**	**Middle**	**Second Highest**	**Highest**
<12 Years	$6,083	$11,247	$11,947	--	--
12 Years	10,841	16,313	18,117	19,132	16,772
13 – 15 Years	15,696	18,627	21,062	19,750	24,250
16+ Years	21,985	25,794	28,334	31,279	34,070
Total	10,898	18,122	21,264	24,445	30,117

Note: -- indicates fewer than 20 cases in the cell.
Source: National Longitudinal Survey of Youth, 1998 interview.

Given the positive influence of literacy proficiency on the employability, annual work effort, and the weekly and annual earnings of adults, one might well expect that many low income adults would be found to possess limited literacy proficiencies.[73] Using the findings of the NALS survey, with its much larger sample size, we classified the native born and the foreign born into the two following income groups:

- *The poor/near poor.* These are individuals who lived in households with a combined annual income below 125 percent of the federal government's poverty income thresholds for households of their given size.[74] The annual income equivalent to 125 percent of the poverty line for a four person household was $17,405 in 1992.
- *Those who were neither poor nor near poor.* These are individuals living in households with incomes above 125 per cent of the poverty line.

Estimates of the shares of the adult population (age 16 and older) that were poor or near poor by proficiency level are displayed in Table 33. Overall, nearly 19% of adults lived in households with incomes below 125% of the poverty line. The fraction of adults that were members of such poor/near poor households varied considerably across composite proficiency levels, ranging from a high of 44% for those with a Level 1 composite proficiency to only 12% for those with a mid-level proficiency (Level 3), and to a low of about 6% for those with a Level 5 proficiency. Those individuals with a Level 1 proficiency were eight times more likely to be poor or near poor than their counterparts with a Level 5 proficiency.

During the last decade, a growing share of the nation's population has been comprised of immigrants. On average, immigrants are more likely to be poor than their native counterparts. During 2000, the poverty rate for the nation's immigrant population was estimated by the U.S. Census Bureau to be 15.7% versus a 10.7 poverty rate for the native born.[75] Approximately 15% of the nation's poor in 2000 were foreign born. Given the growth in the immigrant population, and their relatively high share of the nation's poverty population, we felt it desirable to identify the degree to which the literacy proficiencies of the poor and near poor differed from those of the nonpoor among both the foreign born and native born population.

Estimates of the mean literacy proficiencies of the native born and the foreign born poor/near poor on each of the four literacy scales are displayed in Table 34. Findings are presented for the native born and foreign born separately. On each of the four scales, the mean proficiency scores of the nonpoor native born exceeded those of the poor/near poor by 44 to 53 points, or by 0.7 to 0.9 standard deviations. All of these differences in mean proficiency scores were statistically significant at the 0.01 level.

Table 33:

Income Status Distribution of U.S. Adults, by Composite Proficiency Level

Income Status	Level 1	Level 2	Level 3	Level 4	Level 5	All
Poor or near poor	44	22	12	8	6	19
Neither poor nor near poor	56	79	88	92	94	81

Source: NALS Survey, 1992; tabulations by the authors.

[73] For earlier findings on the literacy proficiencies of poor/near poor adults and welfare recipients from the NALS survey, see: (i) Paul E. Barton and Lynn Jenkins, *Literacy and Dependency: The Literacy Skills of Welfare Recipients in the United States*, Educational Testing Service, Princeton, New Jersey, 1995; (ii) Andrew Sum, *Literacy in the Labor Force*, 1999, Chapter Two.

[74] Our categorization scheme differs somewhat from that of the U.S. Census Bureau. Our unit of observation is the household and the number of its members regardless of their relationship to one another. The U.S. Census Bureau distinguishes family households from non-family households in determining their poverty status. Members of non-family households are each treated as a household of one in determining their poverty status. The incomes of these household members are not combined as they are for family household members.

[75] Among the foreign born, there is a very large difference in poverty rates between those who become naturalized citizens and those who are not citizens, including undocumented immigrants (9.7% vs. 19.4%). See: Joseph Dalaker, *Poverty in the United States: 2000*, Current Population Reports, Consumer Income, P60-214, U.S. Government Printing Office, Washington, DC, September 2001.

Table 34:

Mean Literacy Proficiencies of U.S. Native Born and Immigrant Adults, by Their Poverty/Near Poverty Status

Nativity Status/Proficiency Scale	Poor/Near Poor	Neither Poor Nor Near Poor	Difference	Sig. of Difference
Native Born				
• Prose	249	294	45	.01
• Document	243	287	44	.01
• Quantitative	241	294	53	.01
• Composite	244	292	48	.01
Immigrants				
• Prose	182	245	63	.01
• Document	179	245	66	.01
• Quantitative	181	252	71	.01
• Composite	181	247	66	.01

Source: NALS survey, 1992; tabulations by the authors.

Among the immigrant population, the mean proficiency scores of the nonpoor also substantially surpassed those of the poor/near poor, with the size of these differences ranging from 63 to 71 points on the four literacy scales. Each of these differences were statistically significant at the 0.01 level. It should be noted that the mean proficiency scores of poor/near poor immigrants on each of the four scales were extraordinarily low (179 to 182) and well below those of their native-born poor counterparts.

Other analyses of the literacy proficiencies of the poor/near poor by labor force status revealed that the employed achieved considerably higher mean scores on the prose, document, and quantitative scales than their peers who were not active in the labor force at the time of the NALS survey.[76] A substantial majority of the poor and near poor with no labor force attachment at the time of the NALS survey had Level 1 literacy proficiencies. In the absence of educational interventions capable of substantially raising their proficiencies, many of these individuals will face a lifetime of income inadequacy and dependency problems. Evaluations of the post-program labor market experiences of participants from Job Corps and Welfare to Work programs have revealed that their earnings are significantly influenced by their literacy and math proficiencies, however, these programs had only very limited success in raising their proficiencies over and above those of the control group.[77]

[76] For example, employed members of the poor/near poor population had mean prose scores that were 33 to 43 points above those of their jobless peers. See: Andrew Sum, *Literacy in the Labor Force*, 1999, Chapter 2, Table 2-10, p. 62.

[77] See: (i) Johannes M. Bos, Susan Saivenes, Jason Snipes, Gayle Hamilton, et al., *National Evaluation of Welfare-to-Work Strategies, Improving Basic Skills: The Effects of Adult Education in Welfare-to-Work Programs*, Manpower Demonstration Research Corporation, New York, 2002; (ii) Steven Glazerman, Peter Z. Schochet, John Burghardt, *National Job Corps Study: The Impact of Job Corps on Participants' Literacy Skills*, Mathematica Policy Research, Inc., Princeton, New Jersey, 2000.

The Dependence of Adults and Their Families on Public Transfers

The IALS survey also captured information on the sources of income received by respondents and their families over the previous twelve months. The background questionnaire identified whether respondents or their families received benefits from government cash and in-kind transfer programs, including unemployment compensation, welfare (AFDC) and other public assistance programs, Supplemental Security Income for the disabled and aged, and food stamps.[78] The percent of respondents whose families received any of the above types of cash or in-kind assistance by proficiency level on the prose scale are displayed in Table 35.

Overall, 27% of the respondents reported that either they or their families received some type of cash or in-kind transfers from the federal, state, or local government. The percent of respondents reporting the receipt of such public transfers varied quite widely by their prose proficiency level. Nearly one-half of the respondents with a Level 1 prose proficiency reported the receipt of such transfers versus only a quarter of those in Level 3 and slightly less than 14% of those with a Level 4 or 5 prose proficiency. Each of these differences in the receipt of cash or in-kind transfers was statistically significant at the .05 or .01 level except for that between proficiency Levels 2 and 3. The low earnings and incomes of those adults with limited proficiencies increased their dependence on the government for their economic livelihood. Not only will the less literate pay considerably lower taxes to state and federal governments, but they will be a net burden on the rest of society to support their higher levels of cash and in-kind benefits.

Findings of the NALS survey in the United States and the IALS survey in Canada revealed that many adult welfare recipients have quite limited literacy proficiencies.[79] In the United States, 31% of welfare recipients had only a Level 1 literacy proficiency, and 68% had only a Level 1 or Level 2 proficiency. Similar findings prevailed in Canada. About two-thirds of Social Assistance recipients in Canada were found to have prose, document, or quantitative proficiencies in the two lowest levels of the proficiency distribution.

Table 35:

Percentage of U.S. Respondents Who Received or Were Members of Families Who Received Government Cash Transfers from Federal, State, or Local Government, by Prose Proficiency Level

Percent Receiving Such Transfers	Level 1	Level 2	Level 3	Level 4 or 5	All
Yes	48.6	29.6	24.3	13.9	27.0
No	51.4	70.4	75.7	86.1	73.0

Source: IALS survey, 1994; tabulations by the authors.

[78] At the time of the IALS survey, the main welfare program for single parent families was known as Aid to Families with Dependent Children (AFDC).Following the passage of the national welfare reform legislation in 1996, the name of this program was changed to Temporary Assistance for Needy Families (TANF).

[79] Earlier analyses of the NALS data for the United States and the IALS data for Canada have revealed that many welfare recipients in the United States and Canada have very limited literacy proficiencies, with a substantial majority falling in proficiency Levels 1 and 2. See: (i) Paul E. Barton and Lynn Jenkins, *Literacy and Dependency: The Literacy Skills of Welfare Recipients in the United States*, Educational Testing Service, Princeton, New Jersey, 1995; (ii) Statistics Canada, *Reading the Future: A Portrait of Literacy in Canada*, Ottawa, 1997; (iii) Andrew Sum, *Literacy in the Labor Force*, 1999.

Literacy Proficiencies of Adults and Their Participation in Education and Job Training Programs

The stock of human capital that an individual possesses can be altered over time by participation in a wide array of educational and training programs in schools, colleges, training institutions, community organizations, and work sites. Additions to one's human capital over the work life are believed to be more essential to labor market success in an economic environment that places a greater emphasis on literacy, quantitative, and technical skills.[80] Previous research in the United States on the acquisition of education and training by adults, both on and off the job, has been shown to be strongly associated with their educational attainment, their academic achievement, the occupations and industries of their jobs, and the characteristics of the firms that employ them.[81]

The IALS survey collected a wide array of information from respondents on their education and training activities in the year prior to the assessment. Among the items collected were the number of courses taken, the job-related nature of the education or training, the number of hours spent in each program/course, and the financing of these courses (employer/self or family/government, etc.). Participation in these education and training courses can be cross-tabulated against the literacy proficiencies and other human capital traits of the adult population.

Table 36 presents estimates of the percent of U.S. adults who were enrolled in any type of education or training program over the past twelve months, including adult basic education programs, programs in high schools and colleges, technical/occupational training programs, apprenticeship training, and on-the-job and formal training programs sponsored by the employer. Estimates of participation rates in such programs are provided for all adults and for those in each proficiency level on each of the four literacy scales. Overall, close to 44% of all U.S. adults participated in some type of education or training program over the previous twelve months. The likelihood of their doing so, however, varied quite considerably across proficiency levels on each of the four literacy scales. For example, on the composite scale, only about one of five adults with a Level 1 proficiency enrolled in some type of education or training program versus one-third of those in proficiency Level 2, and nearly two-thirds of those in the two highest proficiency levels. Very similar findings prevailed on each of the other three literacy scales, with the most proficient adults being three times more likely than the least proficient adults to have enrolled in some type of education or training program.

Table 36:

Percentage of U.S. Adults (Age 16 to 65) Enrolled in an Education or Training Program Over the Past 12 Months, by Proficiency Level on Each Literacy Scale

	Proficiency Level				
Literacy Scale	**Level 1**	**Level 2**	**Level 3**	**Level 4 or 5**	**All**
Prose	18.2	33.9	51.0	65.7	43.6
Document	21.4	36.1	53.3	62.8	43.6
Quantitative	22.7	34.2	51.3	59.8	43.6
Composite	20.3	33.3	52.9	63.5	43.6

Source: IALS survey, 1994; tabulations by the authors.

[80] See: (i) OECD, *Lifelong Learning for All*, Paris, 1996; (ii) OECD and Statistics Canada, *Literacy, Economy, and Society: Results of the First International Adult Literacy Survey*, Ottawa, 1995; (iii) OECD and Statistics Canada, *Literacy in the Information Age*, 2000.

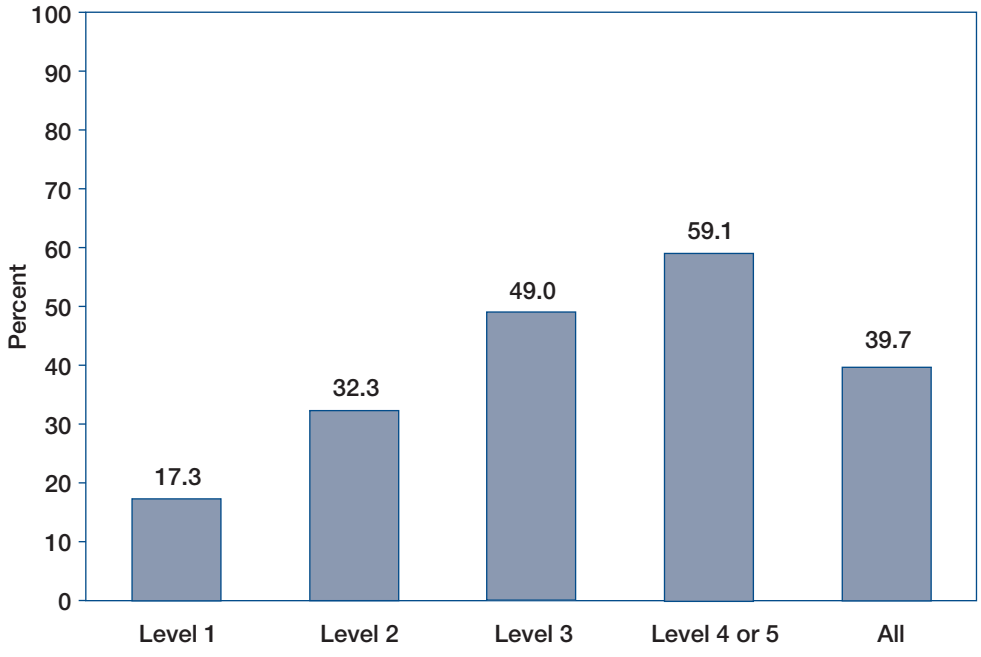
[81] For a review of research findings on the links between educational attainment, literacy proficiencies and participation rates in an array of education and job training programs, see: (i) Andrew Sum, *Literacy in the Labor Force*, 1999, especially Chapter 5; (ii) Andrew Sum, Neeta Fogg, and Garth Mangum, *Confronting the Youth Demographic Challenge: The Labor Market Prospects of Out-of-School Youth*, 2000.

A similar analysis of the education and training experiences of adults, excluding all 16-24 year olds who were enrolled full-time in school and all adults who participated in an education or training program for less than six hours, yields quite similar findings. The degree of participation in such programs ranged from a low of 17% for those adults in document proficiency Level 1 to 49% for those in Level 3 and to a high of 59% for those in proficiency Levels 4 or 5 (Figure 15). All of the differences in program participation rates across proficiency levels were statistically significant at the .01 level. Overall, just under 4 of 10 U.S. adults participated in such programs. In comparison to the performance of 12 other high-income countries on this measure, the United States ranked 8th out of 13. The Scandinavian countries of Denmark, Finland, and Sweden were the top performers on this measure, with 52 to 57% of their adults participating in education or training programs over the past year.[82]

Those persons who enrolled in an education or training program over the previous year were asked to identify the number of courses or programs in which they were enrolled. Findings on the distribution of the enrolled by the number of education or training courses taken are displayed in Table 37 for all enrolled adults and by proficiency level on the composite literacy scale. About 46% of the enrolled reported that they took only one course, another 16% reported two courses, and nearly 38% claimed that they were enrolled in three or more courses over the past year.

Figure 15:

Percentage of U.S. Adults (Age 16 to 65) Who Participated in Adult Education and Training During the Past 12 Months, by Document Proficiency Level



Source: OECD and Statistics Canada, *Literacy in the Information Age*, 2000.

[82] For the findings for these other countries, see: OECD and Statistics Canada, *Literacy in the Information Age*, 2000.

Table 37:

Percentage of U.S. Adults (Age 16 to 65) Enrolled in an Education or Training Program During the Past 12 Months, by Number of Courses and Composite Proficiency Level

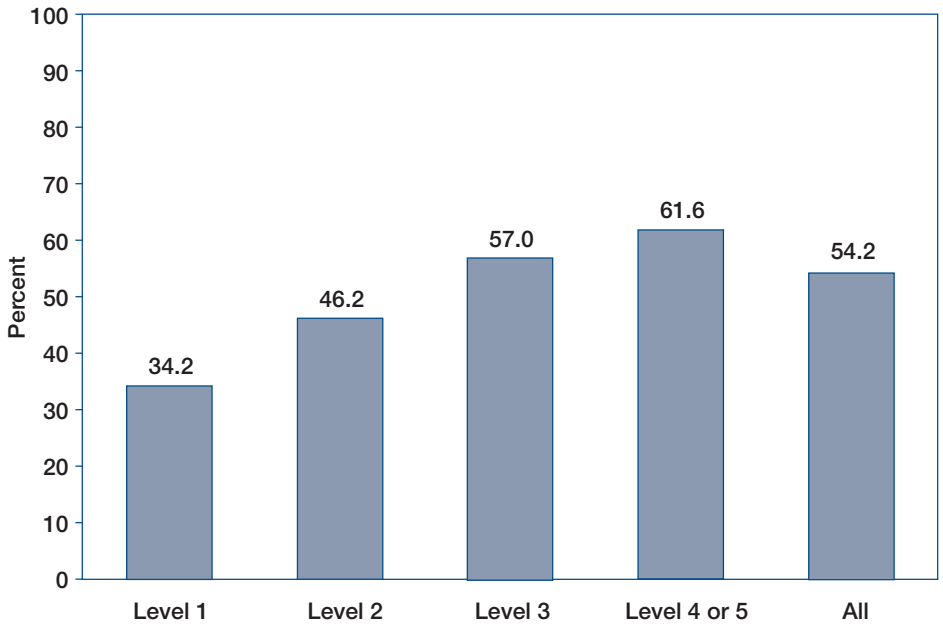
	Composite Proficiency Level				
Number of Courses	**Level 1**	**Level 2**	**Level 3**	**Level 4 or 5**	**All**
One	65.8	53.8	43.0	38.4	45.8
Two	14.6	12.5	17.3	17.8	16.3
Three or More	19.6	33.7	39.7	43.8	37.9

Source: IALS survey, 1994; tabulations by the authors.

The percentage of the enrolled who took two or more courses increased consistently and strongly by their composite proficiency level. Only one-third of those with a Level 1 composite proficiency were enrolled in two or more courses versus 46% of those in proficiency Level 2 and 62% of those in the two highest proficiency levels (Figure 16). Thus, both enrollment in education and training programs and the intensity of such enrollment activities were strongly, positively associated with composite literacy proficiencies. Those adults with the strongest literacy proficiencies were acquiring additional human capital, both on and off the job, at rates substantially higher than those of their less proficient counterparts. These findings will have a number of adverse consequences for future wage and income inequality in the United States.

Figure 16:

Percentage of U.S. Adults (Age 16 to 65) Enrolled in Education or Training Activities Who Took Two or More Courses, by Composite Proficiency Level



Source: IALS Survey, 1994.

The background questionnaire that was used in conducting the IALS survey asked respondents to indicate whether the education or training they had received was job-related and the number of hours of job-related education or training received. Findings on the rate of participation of U.S. adults in job-related education or training activities and the intensity of their participation in such activities are displayed in Table 38. The U.S. rankings among 12 high-income countries also are displayed in this table.[83] The overall participation rate of U.S. adults in job-related education or training activities was 38%, ranking sixth highest among these 12 high-income countries.

The mean hours of participation in job-related education and training programs by those enrolled in such activities was 163. On this measure, the United States ranked 10th among the 12 high-income countries, falling near the bottom of the distribution. When the mean hours of education and training services per adult are calculated, the mean hours drops to only 62. On this performance measure, the United States ranked 9th among these 12 high-income countries, well below the leaders (New Zealand, 113; Denmark, 103; Canada, 98). On not one of the adult education and training measures presented in Table 38 was the United States a world leader.

Who received employer sponsored job-related education and training services in the United States? How did the receipt of such services vary with the literacy demands of the jobs held by such workers? OECD and Statistics Canada researchers constructed a measure of literacy engagement at work, an index based on the degree to which a worker engaged in nine different literacy activities at work involving reading, writing, and selected calculations. Workers were then ranked in order from lowest to highest on the value of this index of literacy engagement, and the distribution was divided into four quartiles. The odds of receiving employer-sponsored training were then calculated for each quartile relative to those in quartile one, the group with the lowest probability of receiving such training.

The unadjusted or raw odds of receiving employer-sponsored training rose very strongly with the workers' index of literacy engagement at work (Table 39). U.S. workers in the second quartile were 2.3 times as likely to receive such training as workers in the first quartile, and those workers in the top quartile were 11.4 times as likely to have received such training as their counterparts in the bottom quartile. The relative difference in odds between the top and bottom of the distribution in the United States was the second highest among

Table 38:

Overall Rates of Participation of U.S. Adults (Age 16 to 65) in Job-Related Education and Training Activities in the Prior Year and Mean Number of Hours per Participant and per Adult

Variable	Percent or Mean Hours	U.S. Rank Among 12 High-Income Countries
Participation rate*	38%	6th
Mean hours per participant	163	10th
Mean hours per adult	62	9th

Note: *Estimates excluded all full-time students ages 16-24 and persons who received less than six hours of education or training.
Source: OECD and Statistics Canada, *Literacy in the Information Age*, 2000, Table 3-11.

[83] The other high-income countries included in the analysis were the following: Australia, Belgium, Canada, Denmark, Finland, Ireland, Netherlands, New Zealand, Norway, Switzerland, and the United Kingdom. Hours of training data were not available for Germany or Sweden.

12 high-income countries for which comparable data were available. At the same time, the relative odds difference (2.31) between workers in the second lowest and lowest quartiles was the third lowest among these 12 countries. Thus, the top quartile of U.S. workers in the literacy engagement index was much more likely to have received employer-sponsored training than their counterparts in the bottom half of the distribution. The bulk of employer-sponsored training in the United States in 1994 was, thus, allocated to the nation's workers who were most engaged in literacy activities at the work site. Most of these workers were both highly educated and literate.

The likelihood of a worker receiving training from the employer varies by occupation, industry of employment, and the part-time/full-time nature of the job.[84] For example, findings of the IALS survey for the United States revealed that professionals, technicians, and managers were much more likely than workers in blue collar and service occupations to have received job-related education or training from their employers.[85] OECD and Statistics Canada researchers calculated an adjusted set of odds for workers who received employer-sponsored training in each quartile of the literacy engagement index. These adjusted odds are controlled to reflect differences in occupations, industries of employment, firm size, and the full-time/part-time nature of the jobs held. The adjusted odds for U.S. workers appear in Table 40. Even after controlling for the above job characteristics, workers who were more engaged in literacy tasks at work were still considerably more likely to have received some employer-sponsored training. Workers in the second highest quartile were nearly four times as likely as workers in the bottom quartile of the literacy engagement index to have received such training and workers in the top quartile were nearly six times as likely to have done so. The relative difference in the adjusted odds of receiving employer-sponsored training between U.S. workers in the top and bottom quartiles was fourth highest among 12 high-income countries, while the relative odds difference between workers in the second lowest and lowest quartiles was the lowest of these 12 countries. The overwhelming share of employer-sponsored training in the United States is devoted to workers with the most literacy-intensive job duties.

Table 39:

Odds of U.S.Employed Adults (Age 16 to 65) Receiving Some Employer-Sponsored Adult Education or Training at Work, by Level of Literacy Engagement at Work (Odds Ratio = 1 for Lowest Quartile)

Quartile of Literacy Engagement	Odds Ratio for Employer-Sponsored Education or Training	Rank Among 12 High-Income Countries
4th (top)	11.4	2nd highest
3rd	6.3	5th highest
2nd	2.3	3rd lowest
1st (bottom)	1.0	

Source: OECD and Statistics Canada, *Literacy in the Information Age*, 2000.

[84] See: (i) Joseph G. Altonji and James R. Spletzer, "Worker Characteristics, Job Characteristics, and the Receipt of On-the-Job Training," *Industrial and Labor Relations Review*, Vol. 45, No. 1, 1991, pp. 58-79; (ii) Lisa M. Lynch, "Race and Gender Differences in Private-Sector Training for Young Workers," in *Proceedings of the Forty-First Annual Meeting, Industrial Relations Research Association*, Madison, 1987; (iii) Andrew Sum, Neeta Fogg, and Garth Mangum, *Confronting the Youth Demographic Challenge*, 2000; (iv) Jonathan R. Veum, "Training Among Young Adults: Who, What Kind, and for How Long?," *Monthly Labor Review*, August 1993, pp. 27-32.

[85] See: OECD and Statistics Canada, *Literacy in the Information Age*, 2000, Table 3-13, pp. 154-155.

Table 40:

Adjusted Odds of U.S.Employed Adults (Age 16 to 65) Receiving Employer-Sponsored Adult Education or Training at Work, by Level of Literacy Engagement at Work (Odds Ratio = 1 for Lowest Quartile)

Quartile of Literacy Engagement	Odds Ratio for Employer-Sponsored Education or Training	U.S. Rank Among 12 High-Income Countries
4th (top)	5.8	4th
3rd	3.8	5th (tied)
2nd	1.7	12th
1st (bottom)	1.0	

Source: OECD and Statistics Canada, *Literacy in the Information Age*, 2000, Figure 3-15, p. 47.

The IALS survey also collected information on the sources of financial support for training received by workers who participated in education and training activities. Employers were the dominant source of financial support for U.S. adults, followed by self/family members. The government was cited as a source of financial support by only 5 percent of U.S. men and 6 percent of U.S. women (Table 41).[86] While government support also was quite modest in most other high-income countries, the United States ranked last among 13 high-income countries for men and tied for second lowest among women. Clearly, there appears to be a role for greater involvement by government in the funding of additional education and training activities for U.S. workers, especially those in front-line blue collar and service occupations, for those with no post-secondary schooling and for those current workers and potential future workers with limited literacy and quantitative proficiencies.

Table 41:

Percentage of U.S. Men and Women (Age 16 to 65) Participating in Adult Education and Training Who Received Financial Support from the Government

Gender Group	Percent	Rank Among 13 High-Income Countries
Men	5	13th
Women	6	12th (tie)

Source: IALS survey, 1994; tabulations by OECD and Statistics Canada

[86] Some of the employer-sponsored training and community-based organizations' educational activities may have been subsidized by federal, state, or local government. Trainees may not be fully informed of the sources of funding.

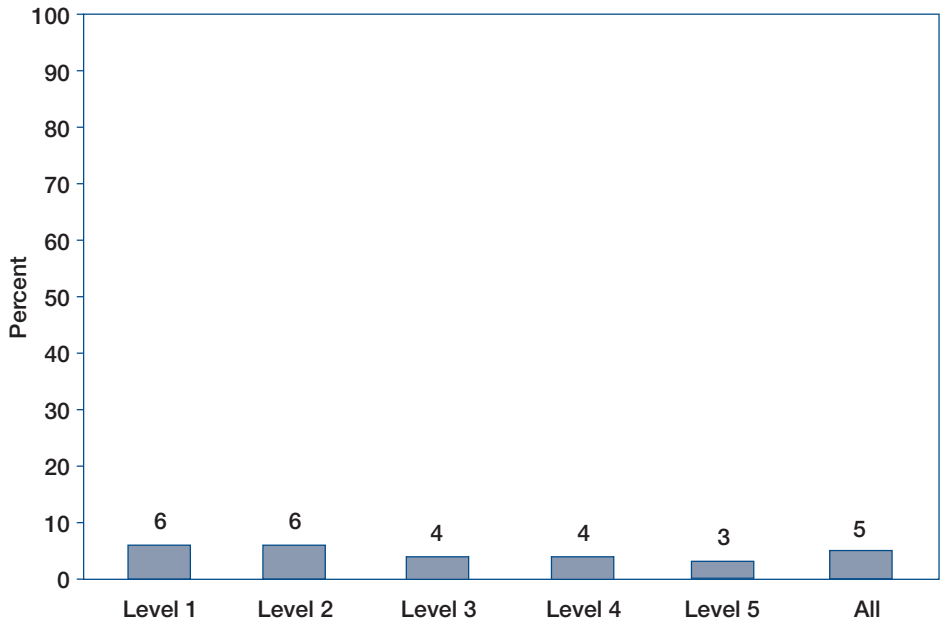
A relatively high share of U.S. workers possesses limited literacy and quantitative skills. Analysis of literacy data from the NALS survey revealed that 40% of the nation's civilian labor force (age 16 and older) had prose and quantitative proficiencies in Levels 1 and 2. The limited literacy skills of these workers sharply reduce both their access to more highly skilled jobs and their weekly and annual earnings. Yet, few of these labor force participants had received any type of basic skills training (reading, writing, arithmetic) over the previous five years.

For the entire labor force, only 5% of workers reported that they had received any type of basic skills instruction over the past five years (Figure 17).[87] Workers with more limited prose proficiencies were slightly more likely to have received such basic skills training than their more literate counterparts. While 6% of the labor force participants in Levels 1 and 2 on the prose proficiency scale reported to have received such instruction only 4% of those in Levels 3 and 4 did so, and 3% of those in Level 5. Eighty percent of those receiving such training claimed that it was provided by employers or labor unions.[88] What was even more interesting is that workers with a Level 4 or 5 prose proficiency were just as likely to have received basic skills training from employers or unions as their peers with only a Level 1 or 2 proficiency.

To upgrade the literacy proficiencies of existing workers, especially those in Levels 1 and 2, a much more concerted private/public partnership will be needed, with increased literacy training at the worksite and in community-based institutions. The need for such investments is being raised by the large influx of new immigrants into the U.S. labor force over the past decade.[89]

Figure 17:

Percentage of U.S. Labor Force Participants (25 to 64) Who Received Any Type of Basic Skills Training in the Past Five Years by Prose Proficiency Level



Source: NALS survey, 1992.

87 For a more detailed analysis of NALS findings on the receipt of education services by U.S. adults, see: Andrew M. Sum, *Literacy in the Labor Force*, 1999, especially Chapter 5.

88 See: Andrew M. Sum, *Literacy in the Labor Force*, 1999, pp. 157-160.

89 Analyses of findings on this set of issues for the nation's immigrant population were presented in a previous report by the authors. See: Andrew Sum, Irwin Kirsch, and Kentaro Yamamoto, *A Human Capital Concern: The Literacy Proficiency of U.S. Immigrants,* Policy Information Report, Center for Global Assessment and Policy Information Center, Educational Testing Service, March 2004.

Employed Adults' Ratings of their Job-Related Reading, Writing, and Math Skills

All employed persons in the IALS survey were asked to rate the adequacy of their reading, writing, and arithmetic skills for their current jobs. The following four categories were used to record responses to this set of questions: "excellent," "good," "moderate," or "poor." The percentage distribution of employed respondents, both in total and by prose proficiency level, across these four rating categories is displayed in Table 42.

Overall, nearly 59% of the employed rated their existing reading skills for job performance as excellent and another 32% rated them as good. Thus, over 91% of the employed considered their existing reading skills as excellent or good while 6% rated them as moderate, and only a little over 3% as poor. The pattern of responses to this question varied considerably by the prose proficiency level of the employed. The share of the employed who rated their reading skills as either poor or moderate ranged from a low of under 2% among those workers with the two highest prose proficiency levels to 4% for those with a mid-level proficiency to a high of 37% among those workers in prose proficiency Level 1 (Table 42). The share of U.S. workers in prose proficiency Level 1 rating their existing reading skills as poor or moderate was actually somewhat above the median share (31.4%) of all such workers in 19 countries participating in the IALS assessment.[90] U.S. workers in prose proficiency Level 2 were slightly less likely than their counterparts in these other countries to rate their skills as poor or only moderate (8% versus 11%).

Given the weak prose competencies of U.S. workers in proficiency Levels 1 and 2, one might have expected higher proportions of them to rate their reading skills as poor or moderate, especially among those in Level 2. However, the question on ratings of existing reading skills was directed at their current jobs, not on desired jobs. Less literate workers frequently obtain jobs that are less literacy intensive; thus, the demands on their reading and writing skills can be quite modest. As evidence, we can examine the findings of the mean index scores for "engagement in reading at work" developed by OECD researchers in their analysis of the IALS data. The index is an admittedly crude one. It measures the responses (yes/no) of

Table 42:

Employed U.S. Adults' Ratings of Their Reading Skills for Their Current Jobs, by Prose Proficiency Level

Rating	Level 1	Level 2	Level 3	Level 4 or 5	All
Excellent	24.2	47.2	67.6	78.3	58.6
Good	38.6	44.4	28.2	20.2	31.9
Moderate	16.1	7.7	3.8	1.5	6.0
Poor	21.0	.6	.3	.0	3.4

Note: Estimates exclude all employed persons with no opinion on this question.
Source: IALS survey, 1994; tabulations by the authors.

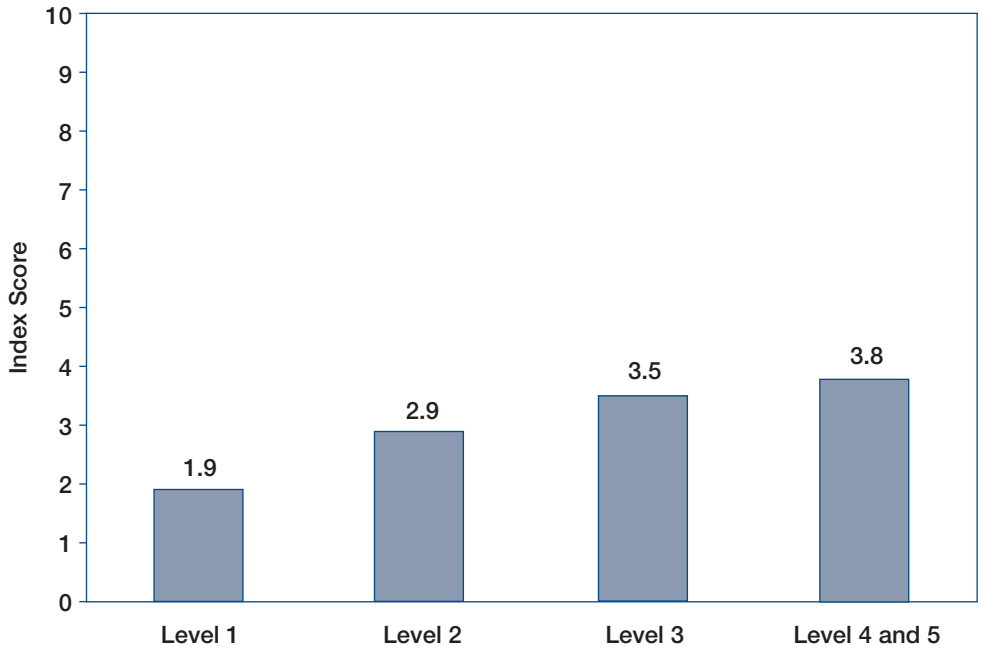
[90] These 19 countries include both high-income and low-income countries. See: OECD and Statistics Canada, *Literacy in the Information Age,* 2000, Table 3, pp. 161-162.

workers to six questions on their use of various literacy materials (letters, reports, manuals, etc.) in the workplace.[91] The index can range in value from 0 to 6. The mean values of the reading engagement index for U.S. workers ranged from 1.9 for those in level 1 to a high of 3.8 for those in Level 4 or 5 (Figure 18). Intensity of use of these materials per week also tends to be higher among those with higher proficiencies. Many of the nation's less proficient workers, thus, do not gain access to jobs that are very literacy intensive. As a consequence, the majority of such workers regard their current reading and writing skills as "excellent" or "good" for their existing jobs.

The employed also were asked to rate their existing writing skills for current job performance. Their responses to this question by proficiency level on the composite literacy scale are displayed in Table 43. Overall, 46% of the employed rated their writing skills as excellent, and 85% rated their present skills as excellent or good. Another 10% categorized their writing skills as moderate, and only 5% considered them to be "poor." The share of the employed rating their writing skills as moderate or poor varied sharply across proficiency levels on the composite skills distribution, ranging from a low of 5 percent for those in proficiency Level 4 or 5 to 15% among those in proficiency Level 2 and to a high of 44% of those in proficiency Level 1. Nearly one-fourth of all of the employed in proficiency level one rated their existing writing skills as "poor."

Figure 18:

Index Score for Engagement in Reading at Work of U.S. Workers, by Document Proficiency Level



Source: IALS Survey, 1994.

[91] A "yes" was assigned if the person said they used such materials at least once per week. OECD and Statistics Canada, *Literacy in the Information Age*, 2000, Table 3-19, pp. 38-40.

Table 43:

Percentage Distribution of Employed U.S. Adults by Their Ratings of Their Writing Skills on Their Current Jobs, by Composite Proficiency Level

Rating	Level 1	Level 2	Level 3	Level 4 or 5	All
Excellent	15.5	37.7	53.5	63.3	46.0
Good	40.8	47.1	38.3	31.3	39.1
Moderate	19.7	12.9	6.9	5.4	10.0
Poor	24.0	2.4	1.3	.0	4.8

Note: Estimates exclude all employed persons with no opinion on this question.
Source: IALS Survey, 1994; tabulations by the authors.

Employed persons were asked also to rate the adequacy of their existing arithmetic skills for current job performance. Despite the comparatively weak performance of employed adults on the quantitative scale, very few claimed that their existing arithmetic skills were moderate or poor (see Table 44). Close to one half of the employed rated their current arithmetic skills as excellent, and nearly 90% regarded them as excellent or good. Another 8% rated their arithmetic skills as only moderate, and fewer than 3% regarded them as poor. As was true for responses to the earlier questions on reading and writing skills, the share of the employed who reported their arithmetic skills as moderate or poor varied quite considerably by proficiency level on the quantitative scale. Only 2% of the most proficient (i.e., those in Level 4 or 5) and 8 percent of those with a mid-level proficiency rated their arithmetic skills as moderate or poor versus 31% of those in the lowest proficiency level (see Figure 19).

Table 44:

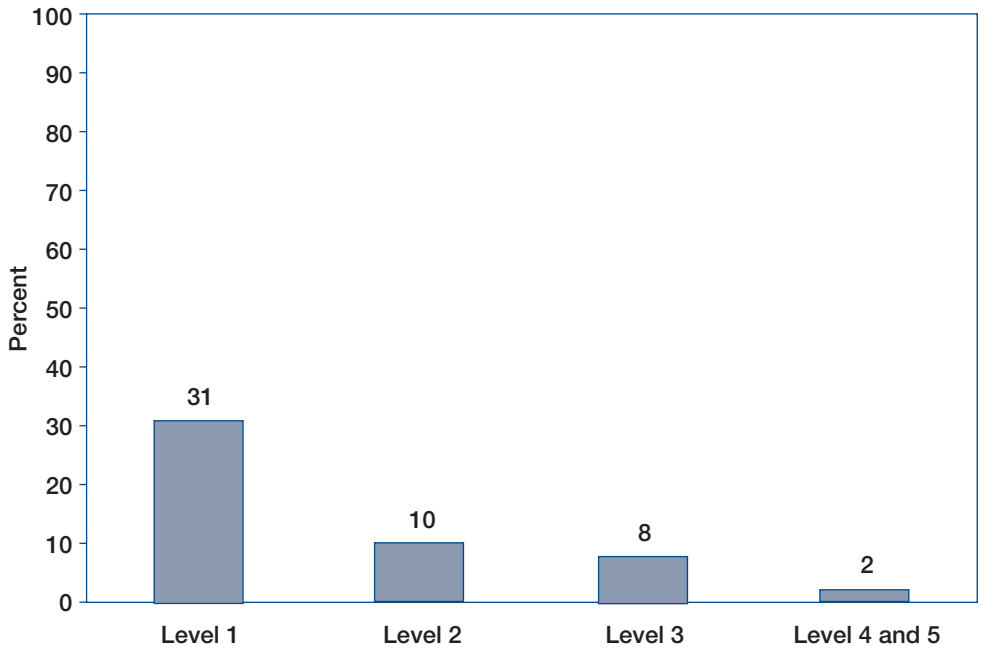
Percentage Distribution of Employed U.S. Adults by Their Ratings of Their Arithmetic Skills on Their Current Jobs, by Quantitative Proficiency Level

Rating	Level 1	Level 2	Level 3	Level 4 or 5	All
Excellent	17.3	35.9	50.9	67.3	46.4
Good	52.0	53.8	40.6	30.7	42.9
Moderate	18.1	8.9	7.3	1.8	7.9
Poor	12.7	1.4	1.1	.2	2.8

Source: IALS survey, 1994; tabulations by the authors.

Figure 19:

Percentage of Employed U.S. Adults Who Rate Their Existing Arithmetic Skills as Moderate or Poor, by Quantitative Proficiency Level



Source: IALS Survey, 1994.

After rating their reading, writing, and arithmetic skills, respondents to the IALS survey were asked to assess whether their existing skills were limiting their job opportunities and promotion prospects. Allowable responses to this question were the following three: greatly limiting, somewhat limiting, and not at all limiting. The distribution of employed adults' responses to the question on the degree to which their existing reading skills limited their job opportunities are presented in Table 45 by proficiency level on the prose scale.

Table 45:

Employed U.S. Adults' Perceptions of the Extent to Which Their Existing Reading Skills Limit Their Job Opportunities, by Prose Proficiency Level

Degree of Limitation	Level 1	Level 2	Level 3	Level 4 or 5	Overall
Greatly limiting	17.4	1.7	.4	.6	3.4
Somewhat limiting	21.8	8.8	4.7	2.8	7.9
Not at all limiting	60.8	89.5	94.8	96.6	88.7

Source: IALS survey, 1994; tabulations by the authors.

Overall, nearly 90% of the employed did not believe their existing reading skills were limiting their job opportunities. About 8% of the respondents felt that their reading skills were "somewhat limiting" their job opportunities, and only 3% reported that they were "greatly limited" by deficient reading skills.

The percent of the employed reporting some limits on job opportunities from their current reading skills varied quite considerably across the proficiency levels on the prose scale. Only 3% of those in Level 4 or 5, 5% of those in Level 3, and 10% of those in Level 2 felt that their job opportunities were constrained by their existing reading skills. In contrast, nearly 40% of those in Level 1 regarded their current reading skills as limiting their job prospects.

OECD performed a similar analysis for 19 countries using findings on the document scale.[92] The share of U.S. workers with a Level 1 document proficiency that believed that their current reading skills were limiting their job prospects was tied for the highest among 19 countries and the share of U.S. workers with a Level 2 document proficiency citing such limitations ranked slightly above the middle of the pack for these same 19 countries. Many workers around the world with limited reading skills do not regard their deficiencies as constraining job opportunities. Perhaps it is the case that many of these workers have limited career ambitions or see their job opportunities for advancement as being dependent on on-the-job training or occupationally-specific training, either on or off the job, rather than through improvements in their reading skills. More research on this set of issues is clearly needed to properly interpret these results.

As part of the IALS survey, employed persons also were asked to assess whether their existing writing skills limited their job opportunities. Responses to this question by composite proficiency level of the employed appear in Table 46. Overall, the vast majority of the employed (89%) did not perceive their existing writing skills as limiting their job opportunities, and only 3% of them felt that their writing skills greatly limited their future job opportunities. Again, we find very large differences in the responses to this question across composite proficiency levels. Only 3 to 4% of workers with a Level 3 or higher composite proficiency believed that their writing skills were limiting their job opportunities versus 11% of those in Level 2 and 37 percent of those with Level 1 composite skills.[93]

Table 46:

Employed U.S. Adults' Perceptions of the Extent to Which their Existing Writing Skills Limit Their Job Opportunities, by Proficiency Level on the Composite Scale

Degree of Limitation	Level 1	Level 2	Level 3	Level 4 or 5	Overall
Greatly limiting	17.1	1.3	.2	1.0	3.4
Somewhat limiting	20.2	10.1	4.4	2.4	7.9
Not at all limiting	62.7	88.5	95.4	96.6	88.7

Source: IALS survey, 1994, tabulations by authors.

[92] OECD and Statistics Canada, *Literacy in the Information Age*, 2000, Table 3-20, pp. 163-164

[93] Findings of the index of engagement of writing at work for U.S. employees revealed that workers with Levels 4 and 5 prose proficiencies had a score 2.3 times as high as those with Level 1 proficiencies. More literate workers were much more likely to be engaged in a variety of writing-related activities on-the-job.

Finally, each employed respondent to the IALS survey was asked whether their job opportunities were being limited by their existing arithmetic skills. Overall, despite their typically weak quantitative skills, 9 of every 10 workers did not feel that their existing arithmetic skills were reducing their job opportunities (Table 47). Even workers in the two lowest quantitative proficiency levels generally did not believe their existing arithmetic skills, which were quite weak, were constraining their job opportunities. Only 15% of the workers in Level 1 and 12% of those in Level 2 reported that they were facing limited job prospects due to their arithmetic proficiencies.

Either these workers were unaware of their limited quantitative proficiencies or did not view their future job prospects or promotion opportunities as being dependent on their arithmetic skills. Whatever the reason for the dissonance between objectively measured existing quantitative skills and workers' perceptions of their future job prospects, those who do not perceive themselves as having math-related deficiencies are unlikely to take steps to improve their skills in this area. Promoting greater personal awareness of existing reading and math deficiencies should therefore be given a higher priority by national, state, and local educational policymakers and administrators.

Table 47:

Employed U.S. Adults' Perceptions of the Extent to Which Their Existing Arithmetic Skills Limit Their Job Opportunities, by Quantitative Proficiency Level

Degree of Limitation	Level 1	Level 2	Level 3	Level 4 or 5	Overall
Greatly limiting	11.0	2.4	.5	.0	2.5
Somewhat limiting	4.4	10.1	4.6	3.1	7.9
Not at all limiting	84.6	87.5	94.9	96.9	89.6

Source: IALS survey, 1994, tabulations by authors.

Summary of Key Findings and Their Public Policy Implications

This research report was designed to describe and assess the literacy proficiencies of the U.S. labor force, to compare the literacy proficiencies of U.S. workers with their counterparts in other high-income countries, and to identify the links between the literacy proficiencies of adults and their success in U.S. labor markets in the 1990s. A summary of key research findings and their public policy implication is presented below.

(i) The literacy proficiencies of adults in the United States were strongly associated with their labor force status and behavior. Adults with stronger composite proficiencies were more likely to be active labor force participants, to avoid unemployment when they did seek work, and to be employed. The unemployment rates of U.S. adults at the time of the IALS survey ranged from a low of 2.4% for those with composite proficiencies in Level 4 or 5 to a high of over 10% for those in Level 1. Employment rates of adults ranged from 57% for those with a Level 1 composite proficiency to a high of just under 88% for those with a Level 4 or 5 proficiency. The links between higher composite proficiencies and employment rates were quite strong for both men and women. A strengthening of the literacy proficiencies of future adults, including immigrants, would boost the size of the resident labor force and facilitate growth in future employment and productivity, thereby raising the economic growth potential of the nation.[94]

(ii) The gaps between the mean literacy proficiencies of the employed and those of the unemployed and persons not active in the labor force at the time of the IALS survey were quite substantial on each literacy scale. On the composite scale, the gap between the mean composite proficiencies of the employed and unemployed was 40 points or nearly two-thirds of a standard deviation, while the gap between the mean composite proficiencies of the employed and those adults not active in the labor force was 28 points or close to .5 standard deviations. Despite the frequently limited literacy and quantitative proficiencies of unemployed applicants for job placement and workforce development services under the Wagner-Peyser labor exchange network and existing state and local one-stop career centers under the Workforce Investment Act (WIA), few applicants are referred to or receive basic education services. There is a clear need to more fully integrate adult basic education with state and local workforce development programs, an initial goal of the Workforce Investment Act of 1998.[95] There also is a need for these WIA youth, adult, and dislocated worker programs to document the reading/math proficiencies of participants at both entry and exit and to identify the gains in literacy and math proficiencies during participation in these programs.

(iii) U.S. adults with both limited (Levels 1 and 2) and modest to strong literacy proficiencies (Levels 3 to 5) were more likely to be employed than each of their counterparts in other high-income IALS countries, but they typically did not possess stronger literacy proficiencies than their employed counterparts elsewhere. The mean composite proficiency score of the employed in the United States was four points, or less than .1 standard deviations, above that of their counterparts in other high-income countries, while the unemployed and those adults not active in the labor force in the United States had composite proficiencies that were statistically identical to those of their counterparts in these same countries. When ranked against the mean proficiency scores of other individual high-income countries, both the employed and the full-time employed in the United States fell only in the middle of the pack with respect to prose skills and in the bottom third of the distribution on the document and quantitative scales. On none of the three literacy scales were the employed in the United States a world leader among these other high-income countries in terms of average proficiency scores.

---

[94] For a review of the links between economic growth and the quantity and quality of schooling in the U.S. and other countries, see: (i) Robert J. Barro, "Education as A Determinant of Economic Growth," in *Education in the Twenty-First Century* (Editor: Edward P. Lazear), Hoover Institution Press, Stanford, 2002, pp. 9-24; (ii) Robert E. Hall, "The Value of Education: Evidence from Around the Globe," in *Education in the Twenty-First Century*, pp. 25-40.

[95] For a review of key goals and programmatic features of the 1998 Workforce Investment Act, see: Garth Mangum, Stephen Mangum, Andrew Sum, and Neal Fogg, *A Second Chance for the Fourth Chance: A Critique of the Workforce Investment Act of 1998,* Sar Levitan Center for Social Policy Studies, Johns Hopkins University, Baltimore, 1999.

(iv) The distribution of the employed in the United States along the composite skills distribution was characterized by a high degree of inequality, in both absolute and relative terms. Inequality in literacy skills among the employed in the United States was among the highest across high-income countries. At the bottom 20 percent of the distribution, the employed in the United States scored modestly below their counterparts in other high-income countries, while workers in the upper half of the distribution, especially from the 70th percentile upward, obtained significantly higher composite proficiency scores (9 to 12 points) than their counterparts elsewhere. The proficiency gaps between workers at the top and bottom of the skills distribution in the United States were consistently larger than those in other high-income countries. These greater disparities in literacy skills among U.S. workers contribute to a higher degree of wage and earnings inequality in the United States. The economic returns to formal schooling and literacy proficiencies in the United States are quite substantial; thus, large gaps in proficiency scores lead to large gaps in earnings.

(v) The likelihood of full-time employment among the employed was typically not strongly associated with their literacy proficiencies. The one major exception was performance on the quantitative scale. Over 87% of the workers with a Level 4 or 5 proficiency on the quantitative scale were employed full-time, a ratio that was significantly higher than the share of the full-time employed among workers in each of the other three lower proficiency levels. Among those persons who worked in the prior calendar year, over 91% of those with a Level 4 or 5 quantitative proficiency were employed for 40 or more weeks while only 80 to 81% of those with a Level 1 or 2 proficiency did so. The higher level of annual work effort by the more literate members of the employed raised both their annual earnings and the aggregate level of output in the economy.

(vi) Our analysis of the literacy and quantitative proficiencies of U.S. workers by major occupational group revealed very large disparities in mean proficiency scores on each of the literacy scales. Workers in professional, management-related, and technical occupations scored the highest on each of the literacy scales, substantially outperforming the employed in service, craft, production/fabricator, and laborer/helper occupations. The size of the gaps in the mean proficiency scores of professional/managerial/technical workers and those in service and blue collar occupations typically ranged from 1.0 to 1.5 standard deviations. While these professional, technical, and managerial workers in the United States frequently outperformed their occupational counterparts in other high-income countries, the mean scores of U.S. service and blue collar workers typically fell in the bottom third of the literacy rankings among the other high-income countries. These large gaps in inter-occupational literacy proficiencies in the United States place constraints on the occupational mobility of U.S. workers and the ability of firms to develop high-performance work organizations. We believe that they also contribute in important ways to the higher wage and earnings inequality among workers in the United States, both directly and indirectly, by raising the economic returns to such proficiencies and to educational attainment.

The projected occupational employment outlook for the United States over the 2000-2010 period by the U.S. Bureau of Labor Statistics has professional and related occupations growing at a rate well above that for all occupations (26% vs. 15%) while employment in management and financial occupations will increase at a rate (13.6%) slightly below the average.[96] Over the decade, professional, managerial, and financial occupations are projected to account for 41% of all net job growth across the country, modestly increasing their share of all occupational employment. In some of the other occupational groups, there will be increased demand for workers with postsecondary educational and vocational degrees. Over the 2000-2010 decade, jobs in occupations requiring formal postsecondary degrees or postsecondary vocational credentials are projected to grow by 9.323 million, accounting for 42% of all job growth in the country. Given the higher literacy and quantitative proficiency requirements for such jobs, their above-average employment growth will modestly raise literacy requirements for workers over the decade. Knowledge of changing literacy requirements within occupations over time is quite limited, but anecdotal evidence and case studies of changing job duties in occupations and industries suggest that literacy

[96] See: Daniel E. Hecker, "Occupational Employment Projections to 2010," *Monthly Labor Review*, November 2001, pp. 57-84.

and quantitative proficiencies are likely to increase in many occupations.[97]

(vii) The supervisory responsibilities of wage and salary workers in the United States and the incidence of self-employment among all of the employed were positively associated with their composite literacy proficiencies. Workers with a Level 4 or 5 composite skills proficiency were twice as likely as their counterparts with a Level 1 proficiency to report some supervisory responsibilities on their job and twice as likely to report extensive supervisory responsibilities. The incidence of self-employment among workers also rose modestly with their composite skill proficiencies, ranging from 7% among those in proficiency Level 1 to 11 percent among those in the two top proficiency levels.

(viii) The weekly and annual earnings of workers in the United States were strongly associated with their literacy proficiencies. On each of the literacy scales, the mean weekly earnings of the full-time employed rose steadily and strongly with their proficiency levels. The mean weekly earnings of the full-time employed in proficiency Level 5 were between two and three times as high as those with a Level 1 proficiency. Strong links between the mean weekly earnings of full-time workers and their proficiency levels prevailed for men and women, Whites, Blacks, and Hispanics, nearly all age groups, and educational attainment groups.[98]

The annual earnings of the employed at the time of the NALS and IALS assessments also were strongly associated with their literacy proficiencies. On the prose, document, quantitative, and composite proficiency scales, the annual earnings of the employed rose uniformly with their proficiency levels. The mean annual earnings of the employed with a Level 5 proficiency were typically three times as high as those of workers with a Level 1 proficiency. Within each major educational attainment subgroup, the annual earnings of U.S. workers increased with their proficiency levels on the quantitative literacy scale. Among workers with an associate's or bachelor's degree, the annual earnings of the employed with a Level 5 proficiency were 80 and 107%, respectively, higher than those of their peers with a Level 1 quantitative proficiency.

Analyses of the IALS data on the distribution of full-time, year-round workers by earnings category revealed that U.S. workers with a Level 4 or 5 composite proficiency were 22 times more likely than their peers with only a Level 1 proficiency to obtain top quintile earnings and 7 times more likely to do so than their peers with a Level 2 proficiency.[99] Findings from the late 1990s interviews of the National Longitudinal Survey of Youth with 33 to 40 year olds revealed that men and women with top quintile scores on the AFQT test (reading, vocabulary, math reasoning, numerical operations) achieved mean annual earnings that were three times as high as those in the bottom quintile of the skills distribution and 62% higher than those with mid-level skills. Higher literacy and quantitative proficiencies of young adults will critically influence their earnings in their later adult years both directly and indirectly through increases in their schooling, training, and cumulative work experience. These earnings effects of stronger literacy and quantitative proficiencies hold true for men, women, Whites, and Blacks. A variety of empirical research studies support the view that reductions in Black-White basic skills differentials would help eliminate Black-White earnings differences.[100]

---

97 See: (i) John Comings, Andrew Sum, and Johan Uvin, *New Skills for A New Economy*, 2000; (ii) Richard Murnane and Frank Levy, *Teaching the New Basic Skills*, The Free Press, New York, 1996; (iii) David Autor, Frank Levy, and Richard I. Murnane, *Upstairs, Downstairs: Computer-Skill Complementarity and Computer-Labor Substitution on Two Floors of A Large Bank*, National Bureau of Economic Research, Cambridge, 2000.

98 In the NALS survey, the simple correlations between the literacy proficiencies of young adults (those under 25) and their weekly earnings were the weakest among all age groups.The size of these correlations rose with the age group of workers. See: Andrew Sum, *Literacy in the Labor Force*, 1999.

99 Full-time, year-round workers are defined as those who were employed for 40 or more weeks in the year prior to the IALS survey and averaged 35 or more hours of work per week.

100 A number of recent research studies on male Black-White earnings differences find that basic skills gaps are an important source of the overall racial wage gap. See: (i) Derek Neal and William Johnson, *The Role of Pre Market Factors in Black-White Wage Differences*, NBER Working Paper No. 5124, Cambridge, Massachusetts, 1995; (ii) William R. Johnson and Derek Neal, "Basic Skills and the Black-White Earnings Gap," in *The Black-White Test Score Gap,* Brookings Institution Press, Washington, D.C., 1998; (iii) Neal Fogg, "An Economic Analysis of Labor Market Outcomes Among Young Adult Men in the United States: 1967-1992," Unpublished Ph.D. dissertation, Department of Economics, Northeastern University, Boston, 1996; (iv) Andrew Sum, *Literacy in the Labor Force,* 1999; (v) Glenn C. Loury, *The Anatomy of Racial Inequality*, Harvard University Press, Cambridge, 2002.

(ix) The likelihood that 16 to 65 year old adults in the United States would be poor or near poor at the time of the NALS survey was closely linked to their literacy proficiencies. The incidence of such income inadequacy problems declined consistently with their proficiency scores on each literacy scale. On the prose scale, adults with a Level 1 proficiency were 10 times more likely to be a member of a poor or near poor family than their peers with a Level 5 proficiency. Strong links between the incidence of poverty/near poverty problems and the literacy proficiencies of adults prevailed among men and women and among the native born and the foreign born. At the time of the NALS survey, 87 to 88% of the immigrant poor/near poor and two-thirds of the native born with such low incomes had prose, document, and quantitative proficiencies in the two lowest proficiency levels.

The limited employability and earnings potential of adults with weak literacy and quantitative proficiencies places them at a high risk of dependency on cash and in-kind transfers from the federal and state government to support themselves and their families. The percent of U.S. adults relying on such public transfers to support themselves at the time of the IALS survey was strongly associated with their literacy proficiencies. Adults with Level 1 prose or quantitative proficiencies were typically four times more likely to be receiving such cash and in-kind transfers than their counterparts with a Level 4 or 5 proficiency. The far lower income and payroll taxes paid by the less literate combined with their considerably greater dependence on cash and in-kind transfers place serious fiscal strains on federal and state budgets.

Future workforce development programs for the economically disadvantaged and welfare recipients need to include substantive basic skills training and other educational components. There is a clear need, however, for closer integration between WIA workforce development/welfare-to-work programs and adult basic education programs. Basic skills training programs by themselves typically fail to substantively improve the employability or earnings of participants. Such basic skills instruction needs to be accompanied by intensive job search training/job development and occupational training with close links to local employers. A recent evaluation of the longer-term effects of Job Training Partnership Act employment and training programs for low-income adults in Massachusetts revealed that those individuals who received integrated basic education/ occupational training services achieved the largest gains in their annual earnings two to three years after their participation in such programs.[101]

(x) Rates of participation in education and training activities of U.S. adults were strongly linked to their literacy proficiencies. On most education and training indices, adults with stronger literacy proficiencies were much more likely to have participated in such activities. Those persons with a Level 4 or 5 proficiency on each literacy scale were three times as likely to have participated in some type of education or training activity as their peers with only a Level 1 proficiency. Of those enrolled in an education or training activity, those with stronger literacy proficiencies were more likely to have enrolled in multiple courses. Very strong relationships between literacy proficiencies and participation in job-related education or training activities also existed.

Employer investments in the education and training of their workers were found to be strongly tied to their literacy engagement at work. Those workers whose job duties involved more reading, writing, and math-related tasks were considerably more likely to have received education or training from their employers. Those employed persons in the top quartile of the literacy-engagement index were eleven times as likely as those in the bottom quartile to have received such education and training services from their employers. The above findings clearly reveal that the "Matthew effect" also prevails among the employed in the United States. Those workers with the "richest" literacy proficiencies were far more likely than their less literate peers to enrich their human capital through personal and employer investments both on and off the job.[102]

---

101 See: UCLA Center for the Study of Urban Poverty, *The Effectiveness of Employment and Training Programs on the Earning Trajectories of Low Income Adults*, *Report Prepared for the Commonwealth Corporation*, Boston, 2003.

102 See: Keith Stanovich, "Matthew Effects in Reading: Some Consequences of Individual Differences in the Acquisition of Literacy," *Reading Research Quarterly*, Vol. 21, 1986, pp. 360-406.

As the "rich get richer in human capital," these widening human capital disparities will exacerbate the already large wage and earnings differentials over the work life.

The IALS data on adult participation in job-related education and training for 13 high-income countries indicate that the United States was not a world leader in these activities during the mid 1990s. The overall participation rate of U.S. adults in such activities was 38%, but we ranked only 6th highest among these 13 countries. The intensity of participation by U.S. adults in such activities ranked only 10th highest among these same 13 countries. Mean annual hours of participation in such training and education activities were only 62, ranking our nation 9th among these 13 countries. The vast bulk of the costs of these activities were borne by adults themselves, their families, and employers. Very few (well under 10%) of the adults receiving job-related education or training cited the government as a funding source for their support.

The patterns of education and training investments by workers and their employers lead to widening differences over time in the stock of human capital possessed by U.S. workers. These growing differences in human capital will intensify differences in the weekly and annual earnings of workers by proficiency level over their work lives.[103] There is a clear need for federal and state governments to work with private sector employers, labor unions, and other education/training providers to expand job-related educational and training investments in the nation's front-line workers, especially those in the bottom half of the literacy distribution. The unfulfilled promises of the Clinton-Gore administration in this area should be placed back on the public policy agenda in the immediate future.[104] As a nation, we need to do more than add resources to existing workplace education and training efforts. We must also demand reform of these systems to broaden participation of more front-line workers in these programs, integrate occupational/technical training with literacy training, and demand greater accountability for results.[105] Few systematic efforts have been made to identify the longer-term employment and earnings impacts of WIA training programs, adult basic education programs, or state-funded incumbent worker training programs.

(xi) A substantial majority of workers in the United States, including those in Levels 1 and 2, believe that their existing reading, writing, and arithmetic skills on their current jobs are good or excellent, and, with the exception of those in Level 1, relatively few feel that their future job opportunities are constrained by their existing proficiencies. There appears to be a high degree of dissonance between the existing literacy proficiencies of many workers in Levels 1 and 2, and some of those in Level 3, and their perceptions of their opportunities for future career advancement. Existing workers and future workers need to be made more aware of both their current proficiencies and those needed to gain entry into higher-skilled and higher-wage occupations. Many economically disadvantaged adults and welfare recipients in the United States lack the fundamental reading, writing, and math skills to successfully participate in postsecondary education and advanced skill training programs. Our ability to expand the pool of well educated and well trained labor will be critically dependent on substantive improvements in the literacy proficiencies of our population. Such improvements will require increased recognition by less literate adults of their limited proficiencies, their willingness to assume greater personal responsibility for boosting those proficiencies, and an expansion of public and private opportunities for them to do so.

---

103 For evidence on weekly wage and annual earnings trajectories of workers over the work life by literacy proficiency level, see: Andrew Sum, *Literacy in the Labor Force*, 2000.

104 See: Governor William Clinton and Senator Al Gore, *Putting People First. How We Can All Change America*, Times Books, New York, 1992.

105 In their review of the progress achieved by America's elementary and secondary schools since the 1983 publication of *A Nation At Risk*, the Koret Task Force on K-12 Education noted that "…when it comes to education reform, wishing doesn't make it happen.Trusting the system to change itself doesn't work. Adding resources without requiring reform is a false hope." We believe that the same views should be applied to large parts of the nation's workforce development system. See: Paul E. Peterson (Editor), *Our Schools and Our Future: Are We Still At Risk?*, Hoover Institution Press, Stanford, 2003.

Appendix A: Unemployment Rates and Employment/Population Ratios of U.S. Adults (Age 16 and Older) by Literacy Proficiency Level

The 1992 NALS assessment also collected data on the labor force activities of sample respondents at the time of the survey. The responses to these questions can be used to estimate unemployment rates and employment/population ratios for working-age adults by proficiency level on each of these three literacy scales. Estimates of unemployment rates for each literacy proficiency subgroup are displayed in Table A-1.[106] With one modest exception, the unemployment rates of adults declined steadily with their proficiency level on each of the three scales. All of the unemployment rates of workers in proficiency Levels 1 and 2 were in the double-digits, and the unemployment rates of workers in proficiency Level 1 were 3.4 to nearly 7 times as high as those of workers in Level 5.[107]

Given the strong associations between the labor force participation rates and unemployment rates of adults in the United States and their literacy proficiencies, their employment rates are also positively linked to their literacy and quantitative proficiencies (Table A-2). On the prose scale, the employment/population ratios of U.S. adults ranged from a low of 41% among those in proficiency Level 1 to a high of 87% for those in proficiency Level 5, a relative difference of more than two to one from top to bottom. Each of the differences in the employment/population ratios across proficiency levels on the prose scale was statistically significant at the .01 level. Very similar patterns in employment/population ratios prevailed for the other two scales.[108]

Table A-1:

Unemployment Rates of U.S. Adults (Age 16 and Over), by Literacy Level

Group/Literacy Scale	Level 1	Level 2	Level 3	Level 4	Level 5	Overall
Prose	17 (1.1)	15 (0.8)	8 (0.4)	6 (0.4)	4 (0.8)	10 (0.3)
Document	17 (1.0)	13 (0.7)	8 (0.5)	5 (0.5)	5 (1.1)	10 (0.3)
Quantitative	20 (1.1)	13 (0.8)	9 (0.5)	5 (0.3)	3 (0.7)	10 (0.3)

Note: Numbers in parentheses are standard errors.
Source: NALS Survey, 1992.

Table A-2:

Employment/Population Ratios of U.S. Adults (Age 16 and Over), by Literacy Level (Percent Employed)

Group/Literacy Scale	Level 1	Level 2	Level 3	Level 4	Level 5	Overall
Prose	41 (1.0)	55 (0.8)	71 (0.6)	78 (0.8)	87 (1.3)	62 (0.4)
Document	39 (0.9)	58 (0.9)	72 (0.6)	82 (0.8)	86 (2.0)	62 (0.4)
Quantitative	38 (1.0)	57 (0.8)	70 (0.6)	80 (0.8)	83 (1.5)	62 (0.4)

Note: Numbers in parentheses are standard errors.
Source: NALS Survey, 1992.

106 Similar to the IALS survey, the unemployment measures from NALS are based on a looser definition of unemployment than that in the CPS household survey.The NALS survey did not collect information on the specific job search measures used by the unemployed or their availability for work during the reference week of the survey.

107 The exception is the unemployment rates of persons in proficiency Levels 4 and 5 on the document scale. Both groups had unemployment rates of five percent at the time of the survey.

108 The differences between the E/P ratios of those in Levels 4 and 5 on the document and quantitative scales were not significant at the .05 level.

Appendix B: The Mean Literacy Proficiencies of U.S. Adults by Labor Force Status

The findings of the 1992 NALS survey also can be used to produce estimates of the mean literacy proficiencies of U.S. adults (age 16 and older) by their labor force status at the time of the assessment.[109] Each respondent was assigned to one of five labor force statuses, and the mean proficiencies of each labor force subgroup on each scale were calculated. The employed were divided into three groups: full-time employed, part-time employed, and those with a job but not at work due to temporary illness, vacation, industrial dispute, etc. Estimates of the mean proficiencies of each labor force subgroup on the three literacy scales are displayed in Table B-1.

Similar to the IALS findings, the employed achieved substantially higher mean literacy scores than either the unemployed or those persons not active in the labor force. The mean proficiencies of the full-time employed exceeded those of the unemployed by 27 to 34 points or approximately 0.5 standard deviations.[110] The gaps between the mean proficiency scores of the full-time employed and those not active in the labor force were even greater, ranging from 42 to 49 points, or 0.7 to 0.8 standard deviations. The mean proficiency scores of those adults not active in the labor force from the NALS survey were 10 to 14 points below those from the IALS survey. This result is primarily due to the fact that the NALS survey included interviews with persons over the age of 65, a substantial majority of whom were not active in the labor force and had low average proficiency scores. Older adults were not included in the sample universe of the IALS survey.

The full-time employed achieved modestly higher mean proficiency scores than the part-time employed.[111] The size of the differences in mean scores between these two groups ranged from only 4 points on the prose scale to 10 points on the quantitative scale. A separate analysis of the proficiency score differences between the full-time and part-time employed by gender revealed that only among men did the full-time employed achieve significantly higher mean scores than the part-time employed.[112] Among women, the mean scores of the full-time and part-time employed were statistically identical.

Table B-1:

Mean Literacy Proficiencies of U.S. Adults (Age 16 and Over), by Labor Force Status

	Literacy Scale		
Labor Force Status	**Prose**	**Document**	**Quantitative**
Employed full-time	288 (0.9)	284 (0.9)	290 (0.9)
Employed part-time	284 (1.4)	277 (1.3)	280 (1.5)
Employed, not at work	285 (2.9)	278 (3.1)	282 (3.2)
Unemployed	260 (2.1)	257 (1.7)	256 (1.8)
Out of labor force	246 (1.1)	237 (1.3)	241 (1.6)

Note: Numbers in parentheses are standard errors.
Source: NALS Survey, 1992.

109 For a more detailed overview of the NALS findings on the proficiencies of adults and their labor force behavior and employment experiences, see: Andrew Sum, *Literacy in the Labor Force*, 1999, especially Chapters 1 and 2.

110 The standard deviations of the prose, document, and quantitative scores for the full-time employed ranged from 61 to 63 points.

111 On a one-to-one comparison, the differences between the mean scores of the full-time employed and part-time employed were significant at the 0.05 level for the prose scale and the 0.01 level for the document and quantitative scales.

112 For a more detailed analysis of test score differences of labor force subgroups by gender, see: Andrew Sum, *Literacy in the Labor Force*, 1999 Chapter 2.

Visit us on the Web at www.ets.org/research

Listening.
Learning.
Leading.

85995-43183 • U104E1.2