Building Career Ladders for the Working Poor Through Literacy Training

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July 2010

Contents

Introduction

Using U.S. Census Bureau data, the U.S. Bureau of Labor Statistics (BLS) determined that 7.1 million workers were living at or below the official poverty level in 2007, which represented 5.1 percent of the total workforce (U.S. Department of Labor [DOL], 2009). The Working Poor Families Project, funded by the Annie E. Casey, Ford, and Joyce and Mott foundations, claims that 25 percent of working families can be considered low income; and, an income level of twice the poverty income was the criterion for working poor (Waldron, Roberts, & Reamer, 2004). Although the operational definitions of "poor" and "working" vary, both the Census Bureau and the Working Poor Families Project document that a willingness to work hard does not equate to a living wage. Beyond the implications this situation has for the welfare of the working poor and their families, having such a significant share of the Nation's workforce permanently attached to a minimally valued job poses a threat to the Nation's ability to provide a workforce for 21st century high-growth industries. The working poor make up a pool of invisible talent that could be the basis for a revitalized workforce that fills high-demand jobs in energy, health, technology, and science sectors of the economy.

In a sense, the working poor might be considered invisible because social safety nets are designed for the unemployed person or the person who meets poverty guidelines. At the same time, the working poor are an overlooked talent pool that demonstrates through individual work histories the essential soft skills that are important for all jobs. Further, the working poor demonstrate the employability skills needed to find jobs and meet an employer's behavioral expectations to sustain employment.

So what accounts for the working poor's inability to hold jobs with higher salaries, especially jobs that are in high-growth industries? Using data collected from the 2003 National Assessment of Adult Literacy (NAAL),[1] this report compares workers who reported an average weekly wage that, if they were employed full time, was less than 125 percent of official poverty levels for a family of three[2] with workers whose hourly wages translate into incomes greater than 125 percent of official poverty levels for a family of three. All workers represented in the NAAL study are thus divided into the working poor and the working nonpoor—or "other workers," for the purposes of this report. Under contract to the DOL's Employment and Training Administration (ETA), the American Institutes for Research (AIR) has used the NAAL data, from a sample of 9,296 workers, to address the following research questions:

- What distinguishes the working poor from other workers?
- What are the literacy requirements that pose barriers to occupations that would lift poor workers to "other" worker status?
- How can ETA's workforce investment system[3] best address the literacy barriers to the upward mobility of the working poor?

A detailed description of background variables and methodology used in this report is provided in Appendix A: Methodology and Technical Notes.

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[1] The 2003 NAAL study (http://nces.ed.gov/naal/) provided information on the literacy proficiency of nearly 18,000 adults, 16 years of age or older. See the appendix of this report for a description of the study. For an interpretation of the literacy scales and performance levels on the NAAL assessment, see Kutner et al. (2007).

[2] This is the income requirement for immigrants imposed by the U.S. Immigration and Naturalization Service (INS), which is less restrictive than the Federal poverty guidelines. (INS 2009).

[3] http://www.doleta.gov/etainfo/wrksys/WIMission

Working Poor Compared With Other Workers

Demographic and Socioeconomic Comparisons

In addition to assessing the literacy skills of respondents, the NAAL gathered extensive background information on their demographic and socioeconomic characteristics (e.g., age, gender, nativity status, schooling, labor force status, household income), along with their practices for gaining information. Table 1 compares age, sex, race/ethnicity, native language, and educational attainment of the working poor with those of other workers and the general population of NAAL respondents[4]

Table 1. Percentage distribution of working poor, other workers, and the general population across demographic and socioeconomic characteristics

Characteristic	Working poor %	Working nonpoor %	General population %
Age			
18–24 years	31* **	8	14
25–39 years	29*	38	28
40–49 years	19*	28	21
50–64 years	15* **	24	22
65+ years	6* **	2	16
Sex			
Female	60* **	40	52
Male	41* **	60	48
Race/ethnicity			
White	62* **	74	71
Black	13*	10	11
Hispanic	19* **	11	12
Other	6	5	6
Language spoken before school			
English only	76* **	83	81
English and Spanish (with or without other)	2	2	2
English and other	3	4	4
Spanish only or with other	4* **	7	8
Other only	4	5	5
Educational attainment			
0–8 years	7*	2	6
9–12 years	11* **	6	9
GED/equivalency	8* **	4	5
H.S. grad	30* **	22	27
Vocational degree	6	6	6
Some college	13	13	12
A.A./2 years of studies	13	14	12
College graduate	7* **	17	12
Graduate studies/degree	4* **	17	11

* Significantly different from other workers at the significance level of 0.05.
** Significantly different from the general population at the significance level of 0.05.
Note: Percentages may not sum to 100% because of rounding.

Age. There was a marked difference between the number of youth 18–24 years of age among the working poor (31 percent) compared with other workers (8 percent), suggesting that income may influence whether youth entered the workforce rather than postsecondary education and training. In no other respect was age a feature that distinguished the two groups of workers.

Sex. The number of females among the working poor (60 percent) and the general population (52 percent) was greater than among other workers (40 percent). This difference may have resulted from two intertwining factors—gender wage gaps and the higher probability that women will be single heads of families. Women earn about 80 percent of what men earn for similar types of jobs (Institute for Women's Policy Research, 2009).

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[4] Many of the background variables examined in this report are based on self-reported data, and because they are also related to one another, complex interactions and relationships among them cannot be explored. Therefore, readers are cautioned not to draw causal inferences on the sole basis of the results presented here.

Women also bear the greater responsibility for rearing children when families break up. According to another report by the Institute for Women's Policy Research, 56 percent of all low-income working mothers are single mothers and are more likely to have younger children than higher income mothers (Lee, 2007).

Race/ethnicity. The working poor were more likely to be white (60 percent) or Hispanic (19 percent) than any other race; however, Hispanic workers were overrepresented among the working poor and white workers were underrepresented. It is important to note that the NAAL found that Spanish-only speakers were significant segments of the working poor, as well, and were also overrepresented among the working poor.

Educational attainment. Not surprisingly, the working poor were less likely to attain college degrees than other workers or the general population; however, the working poor generally matched the educational experience of the general population through high school but then dropped behind other workers and the general population in terms of college degrees. Of all workers surveyed, 34 percent of other workers graduated from college, whereas only 11 percent of the working poor did. However, 81 percent of the working poor graduated from high school including those with General Education Development (GEDs). With the exception of college degree attainment, the working poor in the NAAL sample were very similar to other workers and the general population.

Prose and Quantitative Literacy Levels

The NAAL measured respondents' proficiencies on three literacy scales: prose, document, and quantitative. For each, proficiency was measured on a scale that ranged from 0 to 500. Scores on each of the three literacy scales were characterized in terms of four literacy proficiency levels: *Below Basic, Basic, Intermediate,* and *Proficient.* Given the scope of this report and the high correlation between prose and document literacy, the analyses in this section focus on the prose and quantitative literacy scales only.

Average prose and quantitative scores. Table 2 is a comparison of the NAAL prose and quantitative literacy of the working poor, other workers, and the general population of NAAL respondents. The table first compares the average scores for each group and then presents the percentage distribution of each group across the four levels of literacy proficiency.

Table 2. Average prose and quantitative literacy scores, and percentage in each literacy level of the working poor, other workers, and general population

	Mean	Below Basic %	Basic %	Intermediate %	Proficient %
Prose					
Working poor	266* **	16*	31*	42*	10* **
Other workers	295	7	22	51	21
General population	275	14	29	44	13
Quantitative					
Working poor	275* **	24*	36* **	31*	9* **
Other workers	304	11	29	40	20
General population	283	22	33	33	13

* Significantly different from other workers at the significance level of 0.05.
** Significantly different from the general population at the significance level of 0.05.

The most significant finding is that literacy proficiency consistently distinguished the working poor from other workers. These data reinforce the relevancy of literacy in employment outcomes. For example, the working poor had lower average prose and quantitative literacy scores than not only other workers but the general population. Conversely, other workers had higher average prose and quantitative scores than the general population.

An examination of the percentage distribution of working poor, other workers, and the general population across the four levels of literacy shows that a disproportionate share of the working poor (47 percent) had Basic or Below Basic prose literacy, while 60 percent had either Basic or Below Basic quantitative literacy. Below Basic means that they had no more than the simplest and most concrete prose[5] and quantitative[6] skills, whereas Basic literacy translates into abilities to perform simple, everyday activities, such as finding information in a newspaper article or calculating the cost of a meal based on menu prices. The working poor's distribution across the four levels of literacy closely paralleled the distribution of the general population, but at a slightly lower level of skill. A large majority of other workers (72 percent for prose and 60 percent for quantitative) fell into the Intermediate and Proficient levels of literacy and exceeded the skill levels of the general population by wide margins across all levels in both prose and quantitative literacy.

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[5] Able to locate easily identifiable information in short commonplace prose texts.

[6] Able to locate numbers and use them to perform simple quantitative operations, such as comparing two prices and subtracting.

Literacy and Occupations

The NAAL data offer an opportunity to compare the occupations held by the working poor with those held by other workers. Table 3 shows the distribution of working poor and other workers among NAAL respondents in terms of the type of occupation and the average prose scores of respondents holding each occupation.

Table 3. Average prose literacy scores for working poor and other workers, by occupation

	Working poor		Other workers	
	Overall	Prose	Overall	Prose
Occupation	%	Mean	%	Mean
Management/business/financial	5	297	17	313
Professional and related	12	302	25	325
Service	31	253	11	274
Sales and related	14	276	7	290
Office/administrative support	16	283	14	293
Construction/extraction	5	234	8	259
Installation/maintenance/repair	2	261	5	281
Production	9	238	8	265
Transportation/material moving	7	244	5	259

The most common occupations held by the working poor were the following:

1. Service occupations where the average prose literacy score of workers was 253. Examples are food preparation and grounds maintenance workers.

2. Office and administrative support where the workers' average prose literacy score was 283. Examples are file clerks and word processors.

3. Sales and related where the workers' average prose literacy score was 276. Examples are sales clerks and cashiers.

Among the working poor, 61 percent held occupations in these three categories where workers' average prose literacy scores fell in the range of 253 to 283.

The most common types of occupations held by other workers were the following:

1. Professional and related where workers' average prose literacy score was 325

2. Management/business/financial where workers' average prose literacy score was 313

3. Office/administrative support where workers' average prose score was 293

Among other workers, 56 percent held occupations in these three categories where their average prose literacy score ranged from 292 to 325.

If the average prose score of the majority of working poor was 266 and the average prose score of the majority of other workers was 295, the possibility exists that a majority of working poor could hold jobs common to the majority of other workers by eliminating a relatively small literacy gap.

Literacy's Role in Career Ladders

The NAAL data suggest that literacy proficiency is a pervasive factor influencing the types of jobs workers hold and the wages they earn. To test this thesis, a comparison was made between the average literacy scores of the working poor and the literacy requirements of occupations that typically pay an hourly wage greater than $10.58, the amount required to move a worker classified as poor to the classification of nonpoor. To accommodate the likelihood that the working poor do not generally have college degrees or the financial means to secure college degrees, occupations that require either 2-year or 4-year degrees are limited. To ensure that these occupations are now, and will be in the future, viable opportunities, a final criterion requires that the occupations be designated high-growth occupations.[7]

Fifty representative occupations that meet these criteria were selected. Based on the multiple regression models developed by AIR that integrate Occupational Information Network (O*NET)[8] data and the NAAL literacy measures, each occupation's literacy requirements were derived and then compared with the average literacy levels of the working poor.[9]

Table 4 represents the results of this comparison, organized by occupations that have literacy requirements that are higher than, lower than, or similar to the working poor average for either prose or quantitative literacy. For example, about half (52 percent) of the occupations (represented by the yellow block) require both higher

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[7] www.Careervoyages.gov. This Web site was the primary source for the selection of occupations. In some instances (e.g., construction), where occupations meeting the criteria were numerous, occupations were collapsed into categories that are recognized by the respective industries.
[8] O*NET is a database of information describing all U.S. occupations. See http://online.onetcenter.org/.
[9] The method used to link the O*NET data and the NAAL literacy measures is described in Appendix A.

prose and quantitative literacy levels than the working poor average. Another 11 occupations (22 percent) (represented by the bright green and tan blocks) require higher quantitative literacy levels than the average. Only one occupation—rough carpenter—requires a higher prose literacy level. In summary, the literacy gaps are sufficient to prevent the average working poor from functioning adequately in most (76 percent) occupations that could raise their incomes above 125 percent of the poverty level.

Table 4: Comparison of working poor average literacy level with that required by selected high-growth occupations

		Quantitative		
		Higher	Same	Lower
Prose	**Higher**	Industrial engineering technicians Mechanical drafters Mechanical engineering technicians Chemical technicians Electrical and electronic engineering technicians Statistical assistants Construction managers Licensed practical nurses Electronic drafters Registered nurses Insurance adjusters, examiners, and investigators Electricians Mapping technicians Surveying technicians Medical equipment repairers Food science technicians Payroll and timekeeping clerks Bookkeeping, accounting, and auditing clerks Brokerage clerks Police patrol officers (police and sheriff patrol officers) Food service managers Computer, automated teller and office machine repairers Municipal fire fighters (fire fighters) Industrial machinery mechanics Plumbers Aircraft mechanics and services technicians	Rough carpenter (carpenter)	
	Same	Customer service representatives Bill and account collectors Radiological technicians Electrical and electronics repairers Commercial and industrial equipment Physical therapist assistants Police, fire, and ambulance dispatchers Security and fire alarm systems installers	Freight and cargo inspectors Electrical power-line installers and repairers Aircraft structure, surfaces, rigging Systems and assemblers	
	Lower	Automotive body and related repairers Chefs and head cooks Dental assistants Medical transcriptionists	Truck drivers, heavy and tractor-trailer Dental hygienists Mates—ship, boat, and barge Railroad conductors and yardmasters	Excavating and loading machine and dragline operators Bus and truck mechanics and diesel engine specialists Pipe layers Operating engineers and other construction equipment operators Painters, transportation equipment

NAAL Data's Implications for Literacy Training

Literacy gaps are not the same for all workers for all these occupations, but evidence strongly suggests that literacy levels are relevant to economic advancement among marginal workers. Although 81 percent of the working poor graduated from high school or its equivalent, only 52 percent achieved prose literacy levels higher than Basic level and only 40 percent achieved above the basic level in quantitative literacy. This finding suggests that literacy levels may be more indicative of employment capacity than educational attainment is.

Table 5 presents the 50 high-growth occupations that are achievable for working poor if increases are made in prose and quantitative literacy, and for each occupation, shows the following:

- Differences in prose and quantitative literacy from the average for the working poor
- BLS median wage per hour
- Type of postsecondary training typical for workers in the occupation
- Percentage of workers in the occupation with high school or some college education

Table 5. High-growth occupations within reach of average working poor

Occupation	Prose variance	Quantitative variance	Hourly wage	Education/ training	% workers HS or less	% workers some college
Painters, transportation equipment	–31	–24	18.69	Moderate-term on-the-job training	75.4	20.8
Railroad conductors and yardmasters	–23	–3	29.56	Moderate-term on-the-job training	37.7	51.7
Operating engineers and other construction equipment operators	–21	–20	20.22	Moderate-term on-the-job training	77.8	19.6
Medical transcriptionists	–19	18	15.44	Postsecondary vocational award	30.6	58.9
Mates—ship, boat, and barge	–15	1	30.15	Work experience in a related occupation	54.9	24.2
Dental assistants	–15	7	15.52	Moderate-term on-the-job training	33.6	57.5
Dental hygienists	–14	1	31.21	Associate's degree	2.9	63.8
Pipe layers	–12	–19	16.7	Moderate-term on-the-job training	67.6	28.5
Bus and truck mechanics and diesel engine specialists	–10	–9	19.04	Postsecondary vocational award	65.7	31.2
Truck drivers, heavy and tractor-trailer	–10	–5	18.06	Moderate-term on-the-job training	70.7	25.2
Excavating and loading machine and dragline operators	–9	–12	17.79	Moderate-term on-the-job training	78.8	17.7
Chefs and head cooks	–8	10	19.57	Work experience in a related occupation	47.7	38.8
Automotive body and related repairers	–7	6	18.53	Long-term on-the-job training	74.3	22.5
Security and fire alarm systems installers	–5	13	17.93	Postsecondary vocational award	48.3	44
Freight and cargo inspectors	–4	–2	27.43	Moderate-term on-the-job training	42.8	41.7
Police, fire, and ambulance dispatchers	–4	34	16.38	Moderate-term on-the-job training	44	45.1
Physical therapist assistants	1	14	21.32	Short-term on-the-job training	11.7	65.4
Electrical and electronics repairers, commercial and industrial equipment	3	8	22.9	Postsecondary vocational award	46.4	46
Radiological technicians	3	18	24.59	Associate's degree	7.2	67.9
Bill and account collectors	3	15	15.21	Short-term on-the-job training	38.4	48.2
Electrical power-line installers and repairers	4	1	24.85	Long-term on-the-job training	55.9	38.2

Table 5. High-growth occupations within reach of average working poor

Occupation	Prose variance	Quantitative variance	Hourly wage	Education/ training	% workers HS or less	% workers some college
Customer service representative	4	16	14.93	Moderate-term on-the-job training	33.8	44.2
Aircraft structure, surfaces, rigging, systems and assemblers	5	5	21.24	Moderate-term on-the-job training	58.7	35.3
Aircraft mechanics and services technicians	7	21	23.88	Postsecondary vocational award	32.9	56.6
Plumbers	7	20	22.76	Long-term on-the-job training	67.6	28.5
Industrial machinery mechanics	8	19	21.16	Long-term on-the-job training	55.9	38.8
Rough carpenters (carpenters)	9	3	19.84	Long-term on-the-job training	72.8	21.6
Municipal fire fighters (fire fighters)	9	17	21.22	Long-term on-the-job training	22.9	58.8
Computer, automated teller and office machine repairers	10	30	18.61	Postsecondary vocational award	22.5	52.7
Food service managers	11	23	23.39	Work experience in a related occupation	40	35.8
Police patrol officers (police and sheriff patrol officers)	12	30	24.36	Long-term on-the-job training	15.5	51.7
Brokerage clerks	15	20	19.23	Moderate-term on-the-job training	24.4	44.6
Bookkeeping, accounting, and auditing clerks	15	24	15.76	Moderate-term on-the-job training	33.7	50.3
Payroll and timekeeping clerks	16	19	16.59	Moderate-term on-the-job training	32.9	49.6
Food science technicians	16	21	17.08	Associate's degree	42.7	25.6
Medical equipment repairers	20	39	20.95	Associate's degree	28.3	57
Surveying technicians	20	23	17.26	Moderate-term on-the-job training	42.2	51
Mapping technicians	23	43	17.26	Moderate-term on-the-job training	42.2	51
Electricians	24	17	23.12	Long-term on-the-job training	50.7	42.4
Insurance adjusters, examiners, and investigators	24	32	26.67	Long-term on-the-job training	18.3	35.1
Registered nurses	24	22	30.04	Associate's degree	1	42.7
Electronic drafters	28	31	24.86	Postsecondary vocational award	13	62.4
Licensed practical nurses	29	39	18.72	Postsecondary vocational award	20.6	72.4
Construction managers	30	33	41.26	Bachelor's degree	39.5	31.1
Statistical assistants	32	49	16.45	Moderate-term on-the-job training	23.7	46.5
Electrical and electronic engineering technicians	32	42	25.23	Associate's degree	27.2	54.4
Chemical technicians	35	39	20.39	Associate's degree	30.3	32.5
Mechanical engineering technicians	37	45	23.7	Associate's degree	27.2	54.4
Mechanical drafters	38	48	22.45	Postsecondary vocational award	13	62.4
Industrial engineering technicians	42	51	24.72	Associate's degree	27.2	54.4

This table is a useful guide for an employability development plan creating a career ladder that moves workers from their current literacy levels to literacy levels compatible with high-growth occupations. When combined with O*NET's other resources for conducting a gap analysis to define occupational choices, a complete training plan is possible that integrates literacy training with occupational training to facilitate career transition or movement up a career ladder.

In some cases, this movement may require only a modest investment in literacy training. For example, 21 of the occupations were 10 points or less above the average prose literacy score and 13 occupations were 10 points or less above the average quantitative literacy average. A gap analysis for each individual client sets the stage for efficient, prescriptive training investments that closely target explicit employment objectives for advancement on a career ladder. This strategy also supports contextual literacy training.

To capture this level of systemic efficiency throughout the workforce development system, a number of issues must be addressed. First, One-Stop Career Centers need an efficient and practical means of assessing literacy levels. Second, the NAAL data suggest that the failure of the least literate of the working poor to see literacy as a factor in their employment and their urgent need for steady wages will affect their response as a group to outreach and recruitment strategies and their take-up rates in the workforce investment system training programs. Third, where postsecondary training is needed, training institutions may need to incorporate more efficient literacy training approaches to fit the needs of the working poor. Each of these issues is discussed below.

Need for Literacy Assessment Tools

If actual literacy levels are substituted for the averages used in Table 5, a One-Stop Career Center counselor can easily calculate the literacy gap between a client and one or more occupations. Literacy gaps have implications, whether the objective is employment placement or training. Credibility with employers and clients is enhanced when One-Stop Career Center staff can make a good match between the two. Discussing literacy requirements of the job when a gap is suspected may result in a conditional placement where a literacy "refresher course" can be negotiated, rather than a lost opportunity. The literacy gap also has implications for training referrals because workers who lack the literacy requirements for the occupation are unlikely to fare well in the vocational training for that occupation.

Literacy assessments that correlate to the literacy requirements of O*NET occupations are not available to One-Stop Career Centers or approved eligible training providers. Without this critical piece of information, O*NET is less useful as a training and placement tool, and this may deter long-term positive outcomes.

A literacy assessment tool must meet the following criteria:

- Measure all levels of literacy for both prose and quantitative skills
- Be administrable by One-Stop Career Center professional staff
- Correlate to O*NET database of occupational information

Such an assessment tool is likely to fall short of a comprehensive assessment of literacy but would serve as a useful counseling tool for an employment plan that minimizes inappropriate job and training referrals. At a minimum, it will create system awareness of the importance of literacy in employment outcomes.

The Working Poor as a Target Group

The NAAL survey also examined respondents' practices in getting information and learned that the working poor obtained most of their information about current events, public affairs, and the Government from radio and television. Only about 20 percent reported getting information on the Internet "a lot."

On the subject of job training, a large percentage of the working poor with low (i.e., Below Basic and Basic) literacy did *not* think that their reading, writing, mathematics, or computer skills limited their job opportunities much. Those with low literacy were also less likely to participate in any kind of training.

These findings from the study suggest that outreach to the working poor by One-Stop Career Centers or training institutions should rely on radio or television, or recruitment at the workplace. Employers are beginning to understand the value of higher literacy levels for their workers and may be willing to support literacy programs for their workers. Also, convincing the working poor to give up their jobs for full-time training is unlikely to happen Their paychecks are obviously essential for survival, and the working poor do not see the relationship between their low literacy and their minimally valued jobs. Yet, small changes in literacy proficiency can open doors to better jobs for the working poor once their perceptions and needs as a target group guide outreach services and training logistics.

Changes in How Postsecondary Schools Approach Literacy Training

Literacy or basic education classes are common across most postsecondary schools. Public high schools frequently offer Adult Basic Education (ABE) to assist high school dropouts to earn their GEDs. Vocational technical schools and community colleges offer English as a Second Language (ESL) and ABE programs at night to accommodate working students. Federal Pell grants provide financial assistance to ABE students. The infrastructure for upgrading the literacy levels of the working poor exists in almost every community. However, the NAAL data show that the working poor are unlikely to benefit from these resources. Using the NAAL data in combination with other research offers some reasons why this may be the case and may hold

the answer to why these facilities are not in greater use by the working poor.

First, by definition, the working poor may have little time or money to access even free educational resources. Situational constraints can prevent workers with limited transportation resources or contrary job schedules from attending class. Mothers without childcare or workers who are working several jobs to make ends meet are not available for training (Stowe, 1998). Nor is there much likelihood that online courses are the answer. According to the NAAL data, computer literacy is not common in this group.

Second, the working poor seem unaware that low literacy is a barrier to better jobs. One aspect of low literacy is that common sources of important information—information that may enlighten low-income workers about the value of literacy to employment outcomes—are not accessible.

Third, even those working poor who have access to literacy training and see the need for it experience high dropout rates as they battle situational constraints over time. One study showed that a job, a job promotion, and admission to job training were "compelling motivators" to complete literacy training (Connor & Steadman, 2006, p. 6). However, literacy learners must be motivated long enough to achieve the long list of incremental learning objectives that stand between Below Basic or even Basic literacy and a GED. Once learners acquire sufficient literacy to be functional in their invironments, there are few rewards to making progress through the GED teaching materials. Literacy training may be particularly frustrating for people with high school diplomas.. Training institutions that hope to be successful with this target group must alter their training approaches to address these issues by doing the following:

- **Tailoring the standard ABE offerings to close individual literacy gaps expeditiously:** Literacy learning must be eminently relevant to the learner, and a better paying job is a prize that will motivate. Limiting literacy training to skills directly associated with a future job reduces the time required for career advancement. Reducing the time in training reduces the cumulative effects of situational constraints.

- **Teaching the required literacy skills concurrently with occupational training rather than requiring that students gain the needed literacy level prior to entering skill training:** ABE seems more palatable when it is taught in close association with the skill training which is another way to keep literacy learning focused on clearly relevant learning objectives and learners motivated (Strawn, 2010).

- **Taking literacy training to the workplace:** Training institutions that work with employers to upgrade employees' skills provide a valued service to both employers and workers. Frequently, employers can provide facilities at the workplace for off-hours classes, thus increasing learners'

access to training and providing incalculable motivation.[10]

Summary

A significant number of workers are gainfully employed in jobs that provide bare subsistence wages. The NAAL data provide a basis for comparing data on respondents who are among the working poor with data on other workers, to determine how they differ. The greatest distinction between the working poor and other workers is their literacy levels. The NAAL data show that the working poor, on average, fall below the general population in their literacy proficiency, while other workers fall above the general population. This situation suggests that literacy is very relevant to employment outcomes.

When the average literacy levels of the working poor are compared with the literacy requirements of 50 selected high-growth jobs—jobs that could lift the working poor to the status of other workers—literacy gaps in most of the jobs were found, particularly in quantitative literacy. However, a number of occupations require only modest investments in literacy improvement to be within reach of the average member of the working poor.

There are sufficient data to suggest that literacy changes, even modest ones, can be critical links between minimally valued jobs held by the working poor and jobs in high-growth occupations. With adjustments in One-Stop Career Centers counseling and placement activities, and training institutions' approach to teaching ABE, workers may be able to move into better paying jobs at minimal cost to public resources or themselves.

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[10] Although there are numerous examples of employer-based ABE classes, Malden Mills is the most famous (www.compassionatwork.com/art_malden_mills.html).

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Appendix A: Methodology and Technical Notes

This appendix provides more information about the methodology and research that are referenced in this report, starting with an overview of the 2003 National Assessment of Adult Literacy (NAAL). This section also describes the background variables and statistical procedures used in this report. A final section discusses the methods used to link the O*NET occupation descriptors to the NAAL literacy scales so that literacy gaps between selected high-growth occupations and the working poor could be determined.

The 2003 NAAL Assessment

The 2003 NAAL assessed the English literacy of adults (16 years of age and older) in the United States for the first time since the 1992 National Adult Literacy Survey (NALS). The NAAL provided information on the literacy proficiencies of a nationally representative sample of approximately 18,000 adults living in households and 1,200 prison inmates. In addition to assessing the literacy skills of respondents, the NAAL gathered extensive background information on their demographic and socioeconomic characteristics (e.g., their age, gender, nativity status, schooling, labor force status, and household income), as well as on how they obtain information.

The NAAL measured respondents' proficiencies on three literacy scales:

- Prose literacy. The knowledge and skills needed to search, comprehend, and use information from continuous texts. Prose examples include editorials, news stories, brochures, and instructional materials.
- Document literacy. The knowledge and skills needed to search, comprehend, and use information from noncontinuous texts. Document examples include job applications, payroll forms, transportation schedules, maps, tables, and drug and food labels.
- Quantitative literacy. The knowledge and skills needed to identify and perform computations using numbers that are embedded in printed materials. Examples include balancing a checkbook, figuring out a tip, completing an order form, and determining the amount of interest on a loan from an advertisement.

For each of the literacy scales, proficiency was measured on a scale that ranged from 0 to 500. Scores on each of the literacy scales were characterized in terms of four literacy proficiency levels: *Below Basic*, *Basic*, *Intermediate*, and *Proficient*. For more information on the methodology and findings from the NAAL assessment, see Kutner and colleagues (2007).

Descriptions of Background Variables

Race/Ethnicity

In 2003, all respondents were asked two questions about their race and ethnicity. The first question asked them to indicate whether they were Hispanic or Latino. Then all respondents, including those who indicated they were Hispanic or Latino, were asked to choose one or more of the following groups to describe themselves:

- White
- Black or African American
- Asian
- American Indian or Alaska Native
- Native Hawaiian or other Pacific Islander

Individuals who responded "Yes" to the first question were coded as Hispanic, regardless of their answer to the second question. Individuals who identified more than one group on the second question were coded as Multiracial. Respondents of Native Hawaiian or Pacific Islander origin were grouped with those of Asian origin.

Language Spoken Before Starting School

All respondents were asked what language or languages they learned to speak before starting school. Their responses were then used to divide respondents into three groups: English only, English and other language, or Other language(s).

Highest Educational Attainment

All respondents were asked to indicate the highest level of education they had completed. The following options were provided:

- Still in high school
- Less than high school
- Some high school
- General Education Development (GED) or high school equivalency
- High school graduate
- Vocational, trade, or business school after high school
- College: less than 2 years
- College: associate's degree (A.A.)
- College: 2 or more years, no degree
- College graduate (B.A. or B.S.)
- Postgraduate, no degree
- Postgraduate degree (M.S., M.A., Ph.D., M.D., etc.)

Respondents who reported less than high school or some high school were asked how many years of education they had completed. For certain analyses, some of these groups were collapsed.

Occupation

Respondents who had held a job within the past 3 years were asked to provide the title of their occupation and its most important activities and duties. This information was used to assign each occupation a 2000 Census Bureau code. The occupations were then collapsed into eight major occupational groups:

- Management, business, and financial
- Professional and related
- Service
- Sales and related
- Office and administrative support
- Construction and extraction
- Installation, maintenance, and repair
- Production

Statistical Procedures

Tests of Statistical Significance

All comparisons discussed in this report have been tested for statistical significance using the t statistic. Statistical significance was determined by calculating a t value for the difference between a pair of means, or proportions, and comparing this value with published tables of values at a certain level of significance, called the alpha level. The alpha level is an a priori statement of the probability of inferring that a difference exists when, in fact, it does not. The alpha level used in this report is .05, based on a two-tailed test. Differences in the means and proportions between subgroups were calculated using the following t statistic:

$$t = \frac{(p_1 - p_2)}{\sqrt{(se_1^2 + se_2^2)}}$$

where p_1 and p_2 are the estimates to be compared and se_1 and se_2 are their corresponding standard errors.

When a subgroup was compared to a total group, a modification of the standard error of difference was made to adjust for group dependence. The formula for the adjusted standard error of difference was as follows:

$$SE_{Total-Subgroup} = \sqrt{SE_{Total}^2 + SE_{Subgroup}^2 - 2p SE_{Subgroup}^2}$$

where p is the proportion of the total group contained in the subgroup.

Minimum Sample Sizes for Reporting Subgroup Results

In the NAAL reports, the sample sizes were not always large enough to permit accurate estimates of proficiency and/or background results for one or more categories of variables. For results to be reported for any subgroup, a minimum sample size of 45 was required. This number was arrived at by determining the sample size needed to detect an effect

size of 0.5 with a probability of 0.8 or greater, using a design effect of 1.5. This design effect implies a sample design-based variance 1.5 times that of a simple random sample. The effect size of 0.5 pertains to the true difference in a given mean estimate (e.g., mean proficiency) between the subgroup in question and the total population, divided by the standard deviation of that estimate in the total population. An effect size of 0.5 was chosen following Cohen (1988), who classifies effect size of this magnitude as "medium,"

Linking Occupational Information Network Occupation Descriptors to NAAL Literacy Scales

Several studies support the use of the Occupational Information Network (O*NET) data to determine job requirement levels of employee aptitudes (LaPolice, Carter, & Johnson, 2008). To identify the literacy requirements of the selected high-growth occupations that potentially offer economic independence for the working poor, occupation data related to job analysis ratings of knowledge, skills, and abilities were collected through the O*NET database. However, the ratings of the O*NET occupation descriptors are not on the same scale as the NAAL literacy measures. Therefore, linkage needs to be established between the two measures, so that the average literacy scores of the working poor can be compared with the literacy requirements of those selected occupations. This section describes the method used to link the O*NET occupation descriptors to the NAAL literacy scales.

Following the approach taken by LaPolice and colleagues (2008) in their study "Linking O*NET Descriptors to Occupational Literacy Requirements Using Job Component Validation," AIR used multiple regression models to estimate the respective literacy requirements for the 50 selected occupations on the NAAL 2003 literacy scale. The LaPolice study used a job component validity approach to relate O*NET knowledge, skill, ability, and generalized work activity descriptor data to literacy test scores on NALS conducted in 1992. The study estimated mean NALS 1992 literacy scores for 902 O*NET–Standard Occupational Classification (SOC) (http://www.bls.gov/soc/) occupations using multiple regression models. The study also showed that the NALS literacy scores were highly predictable from the O*NET descriptors.

Specifically, for the purpose of this report, the prose, document, and quantitative literacy scores for 100 occupations were first estimated on the basis of the NAAL database. More than 400 occupations were available through the NAAL database, but these 100 occupations had sufficient sample sizes that allowed reliable estimates. The literacy scores were used as the dependent variable in the multiple regression models for each of the prose, document, and quantitative scales, respectively.

The NAAL occupations were classified according to the 2000 Census Industry and Occupational Codes (U.S. Census Bureau, 2000). The O*NET descriptor data were at the level of O*NET–SOC code. The Census Occupational Codes

were matched to the O*NET–SOC codes before the multiple regression analyses were conducted.

To select the potential predictor variables for the multiple regression models, a team of AIR experts first identified the O*NET descriptors that were conceptually relevant to prose, document, and quantitative literacy. Correlations of the selected predictors and literacy scores were checked, and those predictors with negative or zero correlations were deleted. Then several models were compared in terms of how the descriptors could be further combined. The final set of predictors was determined on the basis of the published O*NET factor model and these predictors are presented in table A.1.

Table A-1. O*NET descriptors identified to predict NAAL literacy scores

Prose	Document	Quantitative
Basic Skills	Basic Skills	Complex Problem Solving
English Language	English Language	English Language
Getting Information	Getting Information	Computers and Electronics
Interacting With Others	Performing Administrative Activities	Cognitive Abilities
Cognitive Abilities	Cognitive Abilities	

The results of the multiple regression analyses are presented in table A.2. Two coefficients in the models are negative, which is contrary to what would be expected. This does not mean that those two variables are negatively related to the criterion; rather, it is very likely due to the effect of multicollinearity[11] (LaPolice et al., 2008). The regression coefficients were then applied to the models described above in estimating the literacy scores of the 50 selected occupations.

Table A-2. Regression coefficients for each regression models

Literacy scale	Predictors	Regression coefficients		Standardized regression coefficients			Adjusted R square
		B	Std. error	Beta	t	p	
Prose	(Constant)	170	6.2		27.5	0	0.8
	BasicSkillsP	12.5	2.7	0.4	4.7	0	
	EnglishLanguage	6.7	2	0.2	3.4	0	
	GettingInformation	–4.9	2.2	–0.1	–2.2	0	
	InteractingWithOthers	7.6	2.2	0.2	3.5	0	
	CognitiveAbilitiesP	9.5	3.3	0.2	2.9	0	
Document	(Constant)	184.9	5.7		32.6	0	0.7
	BasicSkillsD	7.5	2.2	0.3	3.4	0	
	EnglishLanguage	8.8	1.7	0.4	5.3	0	
	GettingInformation	–4.3	2	–0.2	–2.2	0	
	PerformingAdministrativeActivities	5	1.4	0.2	3.5	0	
	CognitiveAbilitiesD	10	3	0.2	3.4	0	
Quantitative	(Constant)	185.1	5.3		34.9	0	0.8
	ComplexProblemSolving	5.9	1.4	0.2	4.2	0	
	EnglishLanguage	9.1	1.5	0.3	6.1	0	
	ComputersandElectronics	3.6	1.3	0.1	2.8	0	

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[11] Multicollinearity is a problem in multiple regression that occurs when variables are so highly correlated with each other that it is difficult to separate the effects of two (or more) variables on an outcome variable and produce reliable estimates of their individual regression coefficients.