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Low Skilled Workforce in the U.S.: Key findings from the Program for International Assessment of Adult Competencies (PIAAC)

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Keywords: adult literacy, adult skills, workforce, international comparison

Abstract: This paper provides an overview of the Program for International Assessment of Adult Competencies (PIAAC), a large-scale international assessment of adult skills. Results on the literacy, numeracy, and digital problem solving skills of the low-skilled U.S. workforce will also be presented.

Introduction

The Program for International Assessment of Adult Competencies (PIAAC) is a large-scale international assessment conducted in 24 countries in 2011-12 with a nationally representative sample of 5,000 adults aged 16 to 65 per country. PIAAC assesses basic skills and a broad range of adult competencies, especially cognitive and workplace skills needed for successful participation in the global economy. PIAAC improves and expands on the cognitive frameworks of previous U.S. adult literacy national and international assessments and also includes a new assessment of problem solving via computer. In addition, PIAAC is capitalizing on prior experiences with large-scale assessments in its approach to survey design and sampling, measurement, data collection procedures, data processing, and weighting and estimation. This includes administration of the entire assessment on laptop computers, which allowed conducting computer-adaptive assessment for the first time in the history of large scale assessments and led to more precise results than previous assessments (OECD Publishing, 2013).

Framework

PIAAC is designed to assess adults' skills on a broad range of abilities in four domains (subjects areas for assessment)—literacy, numeracy, problem solving in technology-rich environments, and reading components—and two modes of assessment—paper-and-pencil and computer-administered. Respondents who are not familiar with computers are given the paper-and-pencil version of the assessment.

PIAAC's definition of Literacy highlights the ranges of cognitive processes involved in "understanding, evaluating, using and engaging with written texts to participate in the society, to achieve one's goals and to develop one's knowledge and potential." This improves upon the definitions of prose and document literacy in IALS and ALL by (a) highlighting the full range of cognitive processes involved in literacy, (b) focusing on a more active role of individuals in society, and (c) includes various text types, both in print and electronic formats (PIAAC Literacy Expert Group, 2009). The primary goal of Reading Components domain is to provide information about the literacy skills of adults at the lower end of the literacy spectrum, focusing

on foundational skills, including reading vocabulary, sentence comprehension, and basic passage comprehension skills (Sabatini & Bruce, 2009).

The definition of Numeracy highlights the cognitive processes involved in "accessing, using, interpreting, and communicating mathematical information and ideas, to engage in and manage mathematical demands of a range of situations in adult life". This improves and expands upon the definition of "quantitative" literacy in IALS and ALL by highlighting the full range of cognitive processes involved in numeracy and expanding the range of mathematical content assessed beyond basic mathematical skills to include tasks that involve objects or pictures, graphs, and technology-based displays; and that require understanding measurement concepts and procedures, geometric displays, and working with formulas (PIAAC Numeracy Expert Group, 2009).

The Problem-Solving in TRE (PS-TRE) domain is an innovative addition to adult literacy and large-scale assessments with the goal of assessing the cognitive processes of problem solving – goal setting, planning, selecting, evaluating, organizing, and communicating – performed in simulated software applications PIAAC Expert Group in Problem Solving in Technology-Rich Environments. (2009).

Assessment Design

All participating countries were required to draw a sample of 5,000 individuals aged 16 to 65 that represent the entire population of adults living in households in the country. The assessment is administered to individuals in their homes and takes approximately one and a half hours to complete. The PIAAC assessment begins with a Background Questionnaire (BQ) which focuses on identifying skills not covered by direct assessment that are critical to functioning successfully in today's society. Specific areas of the BQ include education and training (past and present); work experience; skills used at work and outside of work; personal traits, and background information including gender, age, socioeconomic background, and migration status.

After the background questionnaire, respondents are asked to complete the direct assessment on computer. Respondents who have no computer experience, are unable to use computers, or refuse the computer-based assessment (CBA), are routed to the paper and pencil assessment. In both modes, respondents must complete a core set of literacy and numeracy items. Respondents unable to complete these core items are directed to the reading components domain. The CBA includes two modules that are randomly assigned to one of the three domains. The paper-based version includes one module of either literacy or numeracy items.

PIAAC results are reported as scale scores from 0–500 in all three domains or as percentages of adults reaching five established proficiency levels in literacy and numeracy (Below level 1 and Level 1 to Level 5) and four levels for problem solving in technology-rich environments (Below level 1and Level 1 to Level 3).

The Changing Economy and Demographics of the U.S.

Since 1970, there has been a shift in the U.S. economy away from routine manual, non-routine manual, and routine cognitive tasks and a shift towards and towards more non-routine analytic

and non-routine interpersonal tasks that require higher skills (Autor & Price, 2013). At this same time, there are also shifts in the racial-ethnic composition of the U.S. It is projected that the percentage of the U.S. population that is white will decline from 63% to 43% from 2012 to 2060 and that the percentage that is Hispanic will increase from 17% to 31%. (Frey, 2012)

Research Questions

The questions examined in this paper include: 1) What is the distribution of skills by employment status among U.S. adults? 2) What is the distribution of skills among employed U.S. adults by various characteristics, such as industry, occupation, race/ethnicity, and nativity status? 3) How does skill level relate to the use of skills at work? 4) What is the impact of skill level on income? 5) What is the relationship between skill level and participation in ongoing formal and non-formal education?

Results

Figure 1 shows the distribution of U.S. adults performing at low literacy proficiency levels at each category of self-reported employment status. A lower percentage of those who are employed full-time or part-time perform at the lowest literacy levels (below level 1 to level 2).

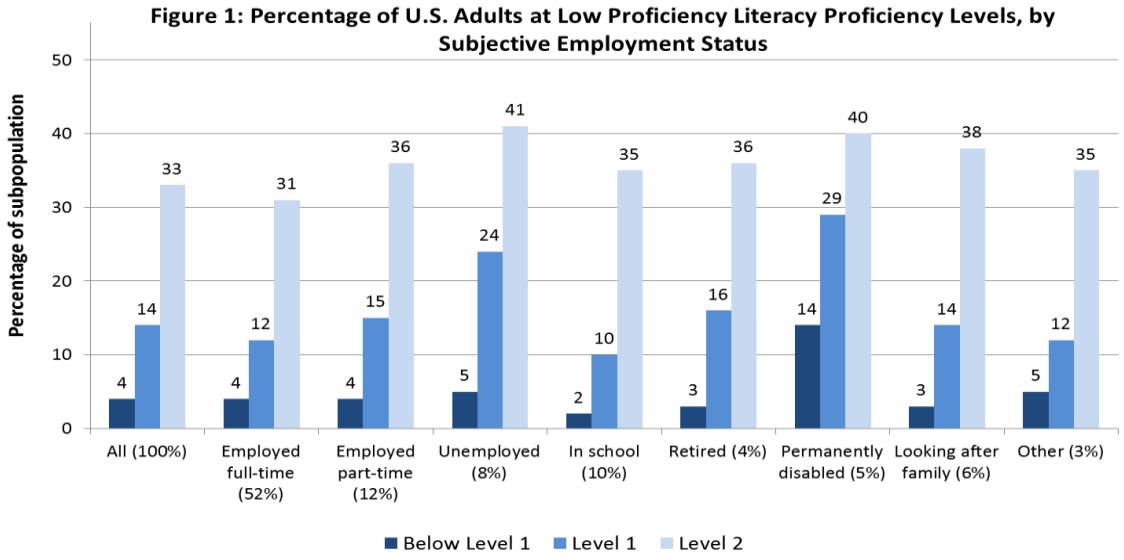


Figure 2 shows that a greater percentage of U.S. adults working in unskilled and semi-skilled occupations are low performers in literacy, compared with their peers across participating countries.

Figure 2: Percentage of Adults at Each Literacy Proficiency Level, by Occupational Skill Level

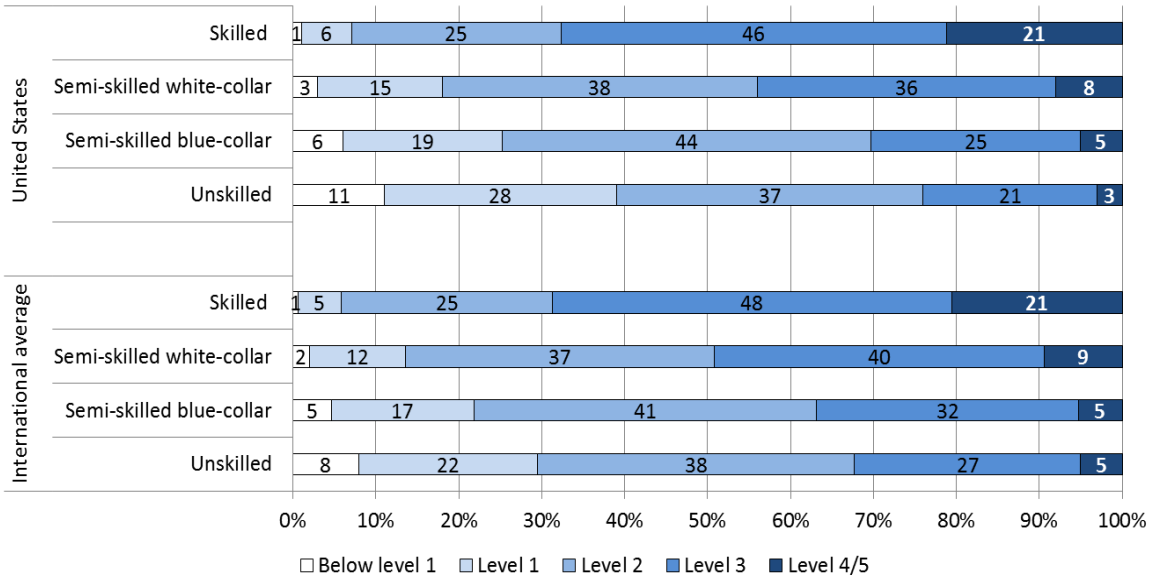
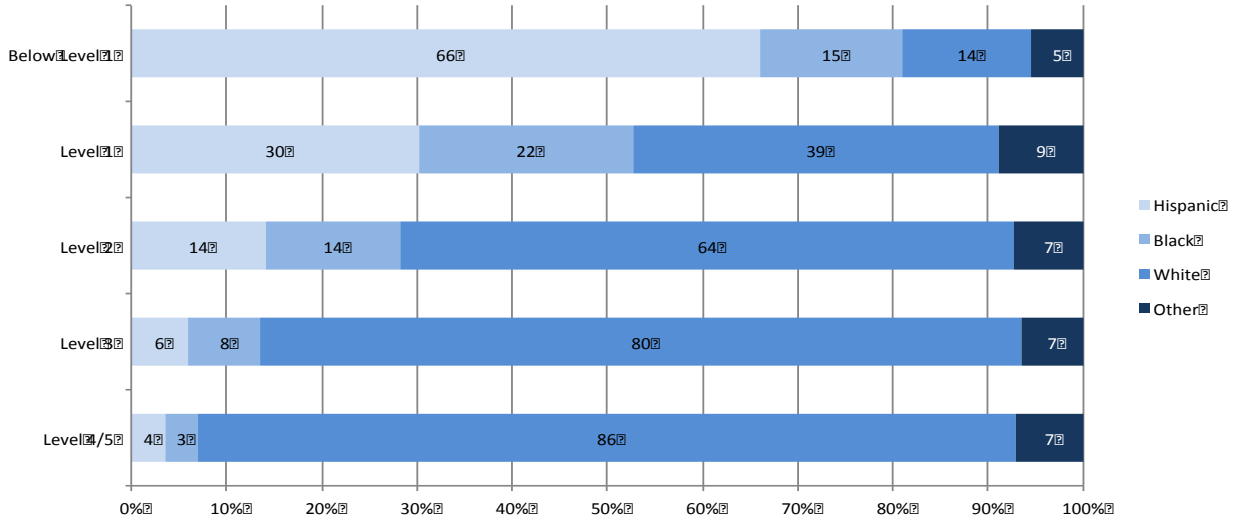


Figure 3 shows that among employed U.S. adults, those who are low skilled in **literacy** are more likely to be Black or Hispanic.

Figure 3. Race/ethnicity of employed U.S. adults, by literacy proficiency level



Other results include: 1) Greater percentages of adults with low levels of literacy and numeracy skills have earnings in the lower income quintiles than adults with high levels of skills. 2) Lower percentages of U.S. workers who participated in formal or non-formal education in the year preceding the survey were low skilled in numeracy than those who did not participate. 3) U.S. workers who are low skilled in literacy use their reading and writing skills at work less frequently than those with high literacy skills.

Implications

Data from previous adult assessments show that skills are a vital resource that enables individuals to progress in different spheres of life. At the core of these basic protective resources are foundation skills – literacy, numeracy, and problem solving – that are measured in PIAAC. As data shows, these foundation skills can be improved through education or training, and facilitate further learning and skill development. Direct measures of these skills in PIAAC provide an information base for better understanding of the complex processes involved in the development and maintenance of skills, and therefore provide guidance and a roadmap for policymakers and practitioners in developing effective policies and practices to enhance skill development and skill gains and diminish skill deficiencies and skill loss.

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