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Adult Transitions to Learning in the USA: What Do PIAAC Survey Results Tell Us?

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What Do PIAAC Survey Results Tell Us?**

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This paper has been commissioned by American Institutes for Research, funded through a contract with the National Center for Education Statistics (NCES).

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In October 2013, early findings from the Programme for the International Assessment of Adult Competencies (PIAAC) were released from OECD. The PIAAC *Survey of Adult Skills* assessed the literacy, numeracy, and technology-related skills of adults age 16 to 65 in 24 countries. An initial finding from the US PIAAC Survey's assessment data was that skill levels of US adults are well below the international average and vary substantially according to education background (Kis & Field, 2013). In a world where advanced skills are requisite to workplace competitiveness, low skills are a danger sign – particularly for adults who face economic challenges.

Another initial PIAAC finding was that half of US adults do not complete a postsecondary degree, which could limit the jobs they take and the income they make (Kis & Field, 2013). According to NCES' *First Look* report on US PIAAC data (Goodman, Finnegan, Mohadjer, Krenzke, & Hogan, 2013), approximately 35 percent of adults attained an associate degree or higher education. These early US PIAAC findings, however, do not necessarily indicate that adults have stopped learning. Referring to initial PIAAC findings, OECD stated: "Indeed, learning does not stop at the end of initial schooling. As individuals age and spend more time out of education, [participation in adult learning] becomes increasingly important for enhancing and maintaining" skills (2013, p. 220). A question remains: do adults continue to learn purposefully – through formal or non-formal learning opportunities – after leaving the secondary setting, and how does purposeful learning relate to their education levels?

The term purposeful learning is used to differentiate adult learning in formal or non-formal settings from learning which is informal and often self-directed (data on informal learning were not collected in the PIAAC dataset). Formal learning is offered by an education or training institution, such as a college, and is structured in terms of learning time and objectives. Non-formal adult learning, also structured and intentional, refers to organized learning activities outside the formal educational system, such as in the workplace. Using PIAAC survey and assessment data, the *Adult Transitions to Learning in the USA* paper identifies adults who pursue purposeful learning in contrast with those who do not – and how either group fares when disaggregated by education background.

Another purpose of the paper is to describe learning types that adults pursue, such as gaining basic skills, postsecondary work, online/distance education, or on-the-job training. The paper also investigates the barriers to learning that adults face, their motivators for learning, and factors that predict whether they transition to purposeful learning as adults. Implications for postsecondary education, workforce training, and policy are discussed.

Literature Review

Transitioning Adult Learners

Adult learners by definition partake of learning activities which promote "any sustained change in thinking, values, or behavior" (Cranton, 1992, p.3); adult learning in the USA is widespread. An estimated 90 million adults have participated in formal and non-formal learning, such as workplace learning or adult basic education (ABE; Ginsberg & Wlodkowski, 2010).

Participation in adult learning in the past three decades has grown. Researchers cite social and economic forces such as an aging population, increases in women in the workforce, rapidly advancing technologies, and workplace change as the main reasons (American Society of Training and Development, 2008; Autor, 2014; Ross-Gordon, 2011). Adult learners are diverse in age, gender, socioeconomic status (SES), and educational background (Hansman & Mott, 2010; Larrotta, 2010).

Participation in adult learning, while widespread, has not grown evenly in adult subpopulations. Using the age of 24 years as a cut-off is one way to distinguish adult learners from traditional learners (Patterson, Zhang, Song, & Guison-Dowdy, 2010). Increasing numbers of learners at non-traditional ages (Ryu, 2010) and more women are participating in learning (NCES, 2006 and 2007). An intriguing early US finding in PIAAC was that the gap in skill levels between older and younger adults was smaller than the gap for many other countries; initial findings also indicated little difference in proficiency yet substantial differences in education attainment by gender (OECD, 2013). PIAAC data findings can add to the knowledge base of adult learning participation by age and by gender.

Another indicator for disparity in learning for adult subpopulations is the connection of socioeconomic status (SES) with assessed skill levels. “Large-scale national and international population surveys that include assessments of adult literacy typically report strong positive correlations among literacy proficiency, educational attainment, employment, and earnings” (Reder, 2013, p. 20). The OECD *Survey of Adult Skills* (2013) cited low literacy and numeracy skills in explaining the relatively weak performance on all PIAAC assessments of U.S. adults. Adult basic skills are strongly influenced by socioeconomic background since having these skills is tied to economic productivity as well as personal and social well-being (Reder, 2010).

A gap by SES may be widening. Autor (2014) links learning with earnings and notes that an earnings “inequality” between US college and high school graduates has more than doubled in the last 30 years. Even though entering employees with high skill levels earn more both initially and over time (Reder, 2010), those living in poverty have the least access to and participation in learning (Ginsberg & Wlodkowski, 2010). A U.S. Department of Labor report (2013) identified 10.5 million adults with incomes below poverty level (often called the working poor). SES may sway high school dropout enrollment in postsecondary education (PSE) more than any other factor (Almeida, Johnson, & Steinberg, 2006).

Two primary types of settings are formal learning and non-formal learning. Formal learning is offered by an education or training institution and is structured in terms of learning time and learning objectives. It is intentional with the explicit goal of the learner acquiring skills, knowledge, or competences (Colley, Hodkinson, & Malcolm, 2002; Merriam, Caffarella, & Baumgartner, 2007). Non-formal adult learning, also structured and intentional, refers to organized learning activities outside the formal educational system. Adults learn to become more skilled, more knowledgeable, and more competent (Merriam et al., 2007; Smith & Smith, 2008).

Skill levels vary widely in both learning settings. Approximately one-fourth of adults with less than a high school education showed the least participation in formal learning, including ABE (Hansman & Mott, 2010). In the Longitudinal Study of Adult Learning (LSAL), formal learning encouraged learning practices, particularly in adults with low skills (Reder, 2007; Reder, 2012). At the opposite end of the skill-level spectrum, the highest participation in formal adult learning was among

adults with at least a bachelor degree (Hansman & Mott, 2010; NCES, 2008). Most adult learners in PSE are women, married with children, or have high family incomes (Cook & King, 2004; Ginsberg & Wlodkowski, 2010).

Adult learning is frequently job-related – that is, many adults choose to learn to enhance their job skills or career prospects, either in or outside the workplace (Ginsberg & Wlodkowski, 2010; Paulson & Boeke, 2006). Initial PIAAC data revealed that the majority of those with low skills are employed, indicating that learning through the workplace may be a “promising route” to improved career prospects (Kis & Field, 2013, p. 13). Gaps in employee participation in learning are not easy to bridge, however; participation in work-related courses is higher for adults with a bachelor degree than for those with a high school education or less (Hansman & Mott, 2010). Businesses tend to prioritize learning for key management and knowledge staff rather than low-skilled employees (Ginsberg & Wlodkowski, 2010).

Apprenticeships and on-the-job training allow organizations to transition new or inexperienced workers into their jobs systematically under the guidance of coworkers or supervisors. When conducted properly, these practices can promote an organizational learning culture and benefit both the organization and participants economically (Peterson, 2010).

Distance learning (DL), developed mainly to tackle deterrents such as time conflicts and remote geographical locations, can be formal or non-formal, and is increasingly online (Archer & Garrison, 2010). An advantage of DL, according to initial PIAAC results, is its potential to “allow workers to adapt learning to their lives” (Schleicher, 2013, 80), but PIAAC data on DL have yet to be analyzed. Learning via technology was noted in early PIAAC findings (OECD, 2013) and warrants further examination. An estimated 12.2 million adults enrolled in DL for formal PSE (Parsad & Lewis, 2008). Formal participation in DL was approximately 20 percent by 2008 (Radford, 2011); higher rates of PSE participation in DL were linked with characteristics of adults with family and work commitments than with those of traditional dependent students (Sikora, 2002). DL participation was low (4 percent) among adults obtaining a GED® credential; participants tended to be young, employed, and without disabilities (Prins, Drayton, & Gungor, 2010).

Barriers to Adult Learning

Factors that typically play a pivotal role in adult learners’ participation or non-participation can be divided into three clusters: situational, institutional, and dispositional (Cross, 1981; Quigley, 2006). Situational barriers result from a person's circumstances at a given point in time. Lack of child care or lack of support from close relatives, for example, can deter participation in learning (McAnnaney, 2009; Patterson, in press). Institutional barriers occur when educational procedures, policies, or practices prevent or limit learner participation. Examples include lack of information, geographic inaccessibility, inconvenient course times, and prohibitive tuition rates. Dispositional barriers refer to learners' self-perceptions and attitudes about failure in learning. Examples include low confidence, negative past experiences, or fear of being “too old” to participate (Patterson, et al., 2010; Quigley, 1997).

Situational barriers are prominent in the literature. Adult learners often balance life roles such as spouse, parent, elder caregiver, and wage earner (Reder, 1999; Ross-Gordon, 2011). Even though women constitute a majority of adult learners, they encounter distinct barriers. Compared with male learners, female learners tend to be more frequently responsible for household tasks and caregiving and may lack support from partners (McAnnaney, 2009; Spellman, 2007).

What situational barriers deter educational growth? Little academic preparation, overwhelming family responsibilities, lack of finances, and social or cultural issues may prevent adult learners from enrolling in PSE (Reder, 2007; Research Allies for Lifelong Learning, 2013). Barriers such as health conditions and learning or physical disabilities can also hamper enrollment in PSE (Patterson, in press). Kis and Field acknowledge that even in a strong US community college system, adults returning for PSE may struggle with low skills or be “burdened with debt” (2013, p. 13), which can prevent PSE completion and thus access to jobs requiring high skills.

Questions also arose from initial PIAAC findings as to whether a lack of awareness of the connection between learning and career prospects hamper participation in learning for adults with low income (Kis and Field, 2013), or even contributes to a “vicious cycle” of minimal learning and fewer career opportunities (OECD, 2013, p. 137). Certainly low-income adults who coped with layoffs or company closures in the economic downturn starting in 2008 were acutely aware of how their jobs and lives were affected, if not that further learning could lead to more job opportunities. Jobs lost then affected the least-educated employees the most and are now being replaced, if only partially, with jobs requiring PSE certificates or degrees in fields such as healthcare, STEM, and manufacturing (Carnevale, Smith, & Strohl, 2013).

Institutional barriers form a third cluster of deterrents to learning. Following initial PIAAC analyses, Schleicher noted institutional barriers related to the transparency of educational systems and to employer support for learning – either with costs or with flexible work schedules – especially for employees with low skills (2013). Participating in PSE may never become a reality for adult learners who cannot navigate through enrollment, program selection, or financial aid processes to get the information they need (Fike & Fike, 2008; Research Allies for Lifelong Learning, 2013). Potential community college enrollees, such as first-generation and immigrant learners, may have to deal with cultural stereotypes, immigration problems, and language barriers (Spellman, 2007). Currently, researchers have limited knowledge of adults not participating in learning, who are seldom included in studies of barriers to ABE or PSE (Hansman and Mott, 2010; Quigley, 2006).

Motivators for Adult Learning

Motivators to learn include both economic incentives and personal goals. For adult learners, whether learning occurs at work or in other settings, “learning needs to be relevant” to daily tasks they “must deal with” (Quigley, 2006, p.121). If adult learners see how learning translates into securing better jobs, higher salaries, or promotions, then learning becomes very relevant (Ginsberg & Wlodkowski, 2010; Schleicher, 2013). In an American Council on Education / GED Testing Service® research study, most interviewees indicated that triggers to start PSE were predominantly work-related; some were inspired by other people’s career roles (Research Allies for Lifelong Learning, 2013;

Quigley, Patterson & Zhang, 2011). Early PIAAC findings point to a connection between learning and employee mobility that deserves further analysis (Schleicher, 2013).

Adults also learn for many diverse personal reasons. Feelings of self-worth and self-esteem are key motivators for adult learners who participate in ABE, ESL, and GED preparation (Hansman & Mott, 2010). For older adults, two primary motivators are learning to learn and learning to connect with others (Lakin & Mullane, 2008). For people with disabilities, gaining self-determination skills has been shown to influence their success in ABE and PSE (Rocco & Fornes, 2010). Learning is also positively associated with health and social outcomes (Autor, 2014; OECD, 2013), and these important connections have yet to be investigated in PIAAC data.

To conclude this review, the literature on adult learners reveals that their learning activities are as diverse as the learners themselves. Analyses of participation rates in ABE, PSE, and workplace learning showed that impoverished and the least educated face the most barriers to learning (Ginsberg & Wlodkowski, 2010). Both economic and personal incentives motivate adults to learn. To lessen earnings inequality (Autor, 2014) and remain economically vibrant, the United States needs to raise the skill levels of the entire population (Carnevale, 2013; Hanushek et.al, 2008; Reder, 2010). Initial OECD survey findings (Kis & Field, 2013) suggest that since nearly two-thirds of the low-skilled adults are employed, workplace programs and employers play a significant role in guiding this group of adults to gain new skills.

Methodology

Sampling and Analytical Approaches

PIAAC data collection relied on a quantitative approach employing a complex sampling design to ensure representativeness of the population (OECD, in press). In the USA 5,010 adults were sampled on laptop computers from 2011 through 2012, completing both an extensive Background Questionnaire and assessments in literacy, numeracy, and problem-solving in technology-rich environments (PSTRE), with 112 adults unable to respond to the Background Questionnaire because of low literacy proficiency. Participant scores were estimated using 10 plausible values per content domain. Scores ranged from 0 to 500 and were classified into one of five levels. Levels for literacy and numeracy were: below Level 1 (0-175), Level 1 (176-225), Level 2 (226-275), Level 3 (276-325), and Levels 4 / 5 (326-500). Levels for PSTRE were below Level 1 (0-240), Level 1 (241-290), Level 2 (291-340), and Level 3 (341-500), according to the PIAAC Technical Report (OECD, in press).

Weights were applied to ensure that each respondent in the sample represented an accurate proportion of the population and that standard errors would reflect the variability estimated in the population rather than in the sample. The population was estimated through the American Community Survey of 2010 at 203,144,374 adults. Adults in gated communities were considered under-represented in the sample. More detail on sampling, weighting, background questionnaire administration, and assessments is available in the PIAAC Technical Report (OECD, in press).

Data files were assembled from public-use files that perturbed and categorized individual data

to ensure confidentiality. Data were analyzed using IDB Analyzer software (available for download through the PIAAC Gateway website) and SPSS. The IDB Analyzer software allowed for means comparison of plausible values for literacy, numeracy, and PSTRE assessments, and for categorical analyses (primarily cross tabulations). To determine if group differences were significant, effect sizes were calculated separately using standard errors generated from the software, with a 95 percent confidence threshold of twice the standard error.

Sequential logistic regression was conducted with four models predicting participation likelihood in formal education or in non-formal learning by education level (i.e., less than high school and high school levels). Nagelkerke R^2 was employed as an effect size for logistic regression models, with odds ratios indicating the effect of individual predictors. Since IDB Analyzer did not permit covariates, logistic regression analyses were conducted directly in SPSS 21 with the complex sampling design feature engaged. Standard errors for predictive factors are therefore comparable to those generated via IDB Analyzer.

PIAAC Participant Descriptives

US PIAAC participants overall ranged in age from 16 to 65 years, with a median age group of 40 to 44 years (for more information on PIAAC participants overall, see Appendix 1, Tables A1 through A4). Females made up 50.9 percent of PIAAC participants. The reported median monthly incomeⁱ was between \$2,423 and \$3,000 – or approximately \$29,000 to \$36,000 per year. Regionallyⁱⁱ adults came from the Northeast USA (18.1 percent), Midwest (21.6 percent), South (36.9 percent), or West (23.4 percent). The majority of participants were native English speakers; 12.1 percent did not speak English outside the home. Reported health-related conditions included difficulty seeing print (11.4 percent), difficulty hearing conversation (8.7 percent), and diagnoses of learning disability (8.0 percent).

Skill levels from PIAAC assessments of US adults, on average, were represented via scores in the Level 2 range, below the international average. The mean score was 270 for literacy (SE = 1.0). At this level respondents were tasked with matching text and information, paraphrasing, and making low-level inferences (OECD, in press). Numeracy scores averaged much lower, with a mean of 253 (SE = 1.2) but still in Level 2. PIAAC respondents at this level could be expected to respond to mathematical content in common contexts and to apply two or more steps to solving math problems. PSTRE scores averaged 277 (SE = 1.1), or at Level 1. The average respondent at that level would be expected to use commonly available technology applications requiring little navigation to access information to solve relatively straightforward problems (OECD, in press).

Adults taking the PIAAC assessment in the USA came from a range of educational backgrounds. As was true for their mothers and fathers, their median educational level of participants was high school completion. Approximately 80 million, or 41.1 percent of adults surveyed in PIAAC, completed high school. A slightly higher percentage, 44.2 percent, representing 86 million adults, reported attending or completing college. While at first glance it may appear that adults completed college at a higher rate than high school, the figures above leave out an important third group, namely those who did not complete high school. Nearly 29 million adults did not complete high school, approximately 14.7 percent of those aged 16 to 65. With the first and third groups combined, it is apparent that 55.8

percent of working-age Americans had not completed formal education beyond a secondary level.

Even though more adults ended formal learning with high school than with college, one in four adults (24.9 percent) participated in formal education in 12 months prior to PIAAC assessment (i.e., “in the past year”), and more than half (56.2 percent) pursued non-formal educationⁱⁱⁱ. When asked if they had ever not completed a program of study they started, 31.3 percent replied that they had not finished a degree or other program of study.

Most adults were employed (73.9 percent), typically working in one job or business in the past week. The remainder reported being either unemployed (7.9 percent) or out of the labor force (18.7 percent). Less than two percent were apprenticed. One-third of employed participants managed other employees. Approximately half of employees (52.2 percent) worked full time, with 12.1 percent working part-time; the modal weekly work schedule was 21 to 40 hours. Employed adults most often worked in the private sector (74.2 percent). Their workplaces were typically small businesses; the mode for workplace size was 11 to 50 employees, and they most often perceived the size of the workplace as staying essentially the same. Half of employees (52 percent) had worked in more than one company within five years prior to the PIAAC assessment. Only 13.9 percent were self-employed.

Definitions and Background Questionnaire Variables

Adults participating in the PIAAC Survey and assessments are divided into two major groups for this paper, Learners and Non-Learners, on the basis of the learning information collected in the survey. *Learners* are those who pursued either formal or non-formal learning in the 12 months prior to PIAAC participation (i.e., as indicated from variables FE12 or NFE12). *Non-Learners* are those who pursued no learning according to PIAAC designations of formal or non-formal learning. Adults in both major groups are further disaggregated by education completion status in three levels: 1) those with *less than high school* (ISCED <1, 1, or 2) those *completing high school* (i.e., ISCED 3) those *attending or completing postsecondary programs* (i.e., international ISCED levels 4, 5, or 6). These three education levels are designated throughout the paper as LHS, HS, and PSE, respectively. While all three groups are examined, the major focus of analyses is on LHS and HS groups, as these groups tend to be most in need in terms of the labor market yet reported little, if any, postsecondary learning.

Another key variable is monthly income; this variable includes monthly wages earned, as well as bonuses, and was originally organized into deciles. For purposes of this paper, it was re-grouped at the median to *high income* (deciles 6 through 10) and *low income* (deciles 1 through 5) to ensure sufficient cell size in analyses; the median ranged between \$2,423 and \$3,000 monthly, or approximately \$29,000 to \$36,000 annually, which represents 300 percent of federal poverty level for an individual (U.S. Census Bureau, 2012). Additional variables from the PIAAC Background Questionnaire include age and education and work status. Age was categorized in groups as 16 to 19 years, and then in five-year increments from 20 through 65 years. Education and work status categorized a Non-Learner as being primarily in work only or as NEET (i.e., not employed nor in education) and categorized a Learner as being primarily in education, in work only, or a combination of work and learning.

For further context, it is also important to explain uses of the terms *job-related reasons* and *employer support*. Job-related reasons for non-formal learning include both short-term and long-term reasons, such as to do their current job better, improve their career prospects, or satisfy employer requirements. Employer support refers to an employer paying for some or all costs of participating in formal or non-formal learning. Adults could also designate whether there were no such costs or whether they did not receive support because they were not employed while learning.

Research Questions

After reviewing the literature and establishing definitions from the PIAAC data, five research questions were developed for this paper:

1. How do Learners in each of the three education level groups (i.e., LHS, HS, and, where relevant, PSE) differ from Non-Learners, by demographic characteristics, skill levels, and educational and employment background?
2. What types of formal and non-formal learning do Learners report pursuing?
3. What barriers to learning do Learners and Non-Learners report?
4. What personal-interest and job-related motivators for learning do Learners and Non-Learners report?
5. Controlling for gender age, and income, do job satisfaction, job stability, and family factors predict adult participation in formal or non-formal learning?

Findings

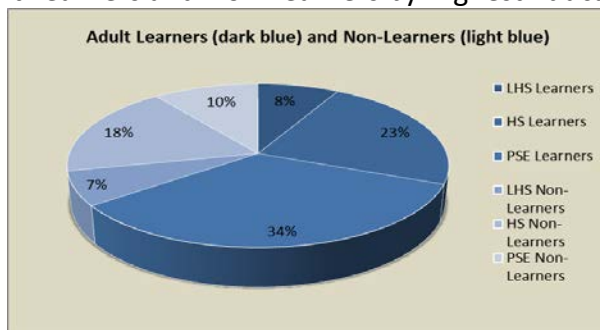
Describing Learners and Non-Learners by Educational Background

The remainder of this paper compares Learners and Non-Learners by their education levels (i.e., LHS, HS, and where relevant, PSE) as defined. The first research question addresses a need to better understand demographic and background characteristics of an estimated 194 million adults, as well as their current skill levels. Learners and Non-Learners, particularly those with a high school education or less, may be characterized in terms of region, age, gender, income, household composition, and disability status. In-depth characterizations of their education background – when they completed or left school as well as their parents’ education attainment – and employment background – their employment status, sector, work hours, and job satisfaction – fill in the descriptions. Describing their current skill levels in literacy, numeracy, and PSTRE begins to explain the role of learning at each education level, especially where learning differentiates skill levels even for those with similar education backgrounds. These descriptions not only help characterize who Learners and Non-Learners are but also provide the backdrop to contextualize the types of learning they pursue, barriers they face, and reasons that motivate them.

Learners comprised the largest portion of any education level and tended to have higher education completion levels than Non-Learners. Learners included an estimated 15.4 million LHS, 44.7

million HS, and 65.8 million PSE adults (see Figure 1 for percentages). The estimated numbers of Non-Learners were 13.2 million LHS, 35.1 million HS, and 20 million PSE adults.

Figure 1. Adult Learners and Non-Learners by Highest Education Level



Demographics

Demographic data collected in the PIAAC background questionnaire allow participating adult Learners and Non-Learners to be characterized in terms of region, age, gender, income, household composition, and disability status. Table 1 compares demographic characteristics of Learners and Non-Learners. Regionally, Learners in the Northeast USA tended to have the highest percentage of PSE Learners and Non-Learners whereas the Southern USA had the highest proportions of LHS and HS Non-Learners. In terms of age, the median age group for Learners increased with each education level completed. LHS and HS Non-Learners were older than LHS and HS Learners overall.

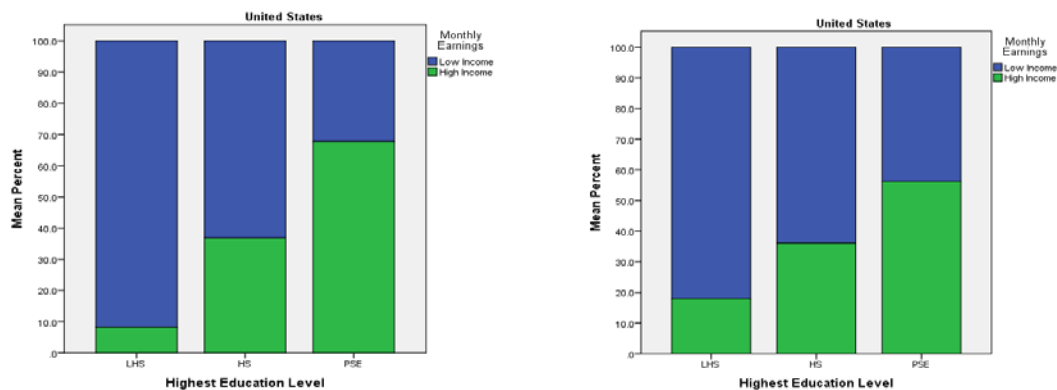
Table 1. Adult Learner and Non-Learner Demographics by Highest Education Level

Characteristic	Learners			Non-Learners		
	LHS (%)	HS (%)	PSE (%)	LHS (%)	HS (%)	PSE (%)
Region: Northeast	10.8	27.8	61.4	12.1	51.4	36.5
Region: Midwest	12.5	37.0	50.6	14.3	53.7	32.0
Region: South	13.8	35.5	50.7	23.4	54.9	21.7
Region: West	10.9	39.8	49.3	22.6	42.6	34.9
Median Age (in years)	16-19	30-34	40-44	45-49	45-49	45-49
Gender: Female	44.7	48.6	53.4	49.4	50.1	58.1
Income: Low	91.8	63.2	32.2	82.0	63.9	43.9
Partner Status: Single	75.4	44.6	22.7	31.7	21.4	22.9
Median Household Size	4	3	3	3	3	3
Difficulty Seeing	10.2	9.6	7.4	27.7	14.6	12.7
Difficulty Hearing	7.0	7.5	7.2	12.4	12.5	8.8

Characteristic	Learners			Non-Learners		
	LHS (%)	HS (%)	PSE (%)	LHS (%)	HS (%)	PSE (%)
Difficulty Hearing	25-34	35-44	45-54	45-54	45-54	45-54
Median Age	Years	Years	Years	Years	Years	Years
Learning Disabilities	13.1	8.5	4.9	17.0	8.6	6.4
Learning Disabilities Gender: Male	56.9	61.1	57.5	51.3	66.6	38.6

By gender, the percentage of female Learners increased and the percentage of male Learners decreased with higher education levels (see Table 1). As shown in Figure 2, most LHS and HS Learners and Non-Learners earned a low monthly income (i.e., less than a median annualized \$29,000 to \$36,000), placing them below 300 percent of poverty. In contrast, two-thirds of PSE Learners earned a high income (i.e., above \$36,000), which suggests a premium in earnings for those with college degrees who continue to learn over those who don't.

Figure 2. Adult Learner and Non-Learner Monthly Earnings Group by Highest Education Level

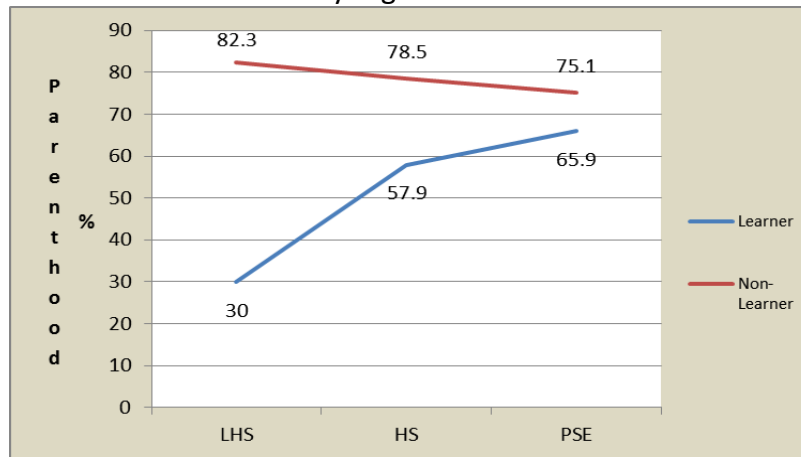


Concerning household composition, LHS and HS Non-Learners were partnered at more than twice the rate of their Learner counterparts. The relationship of learning and partnership is partially attributable to age (LHS and HS Learners were generally younger than Non-Learners); however, the data also indicated that single adults may have additional time or opportunity to learn.

Spouses or partners, according to PIAAC respondents who were partnered, were generally employed full time, at increasingly higher rates as the PIAAC participant's education level rose. The median household size for LHS Learners was four people; for all other categories, the median was three (see Table 1). This difference appears to represent young adults (age 24 and below) who may live at home with parents and siblings, or with roommates.

As education levels for Learners increased, so did the prevalence of parenthood (see Figure 3). Although parenthood rates were higher for Non-Learners than for Learners, the rate of Non-Learners having children decreased as education level increased. About half of Learners and nearly two-thirds of Non-Learners, at all education levels, reported having a youngest child who was at least age 13.

Figure 3. Rate of Parenthood by Highest Education Level and Learner Status



Data on visual difficulties, hearing difficulties, and learning disabilities (LD) were also collected in PIAAC (see Table 1). LHS and HS Non-Learners experienced visual and hearing difficulties more than LHS and HS Learners did. LHS Non-Learners reported the highest rate of visual difficulties, 27.2 percent. The proportion of difficulties seeing print decreased with higher education levels. The average age group for Learners reporting hearing difficulties increased with education level; it was 25 to 34 years for LHS Learners and 35 to 44 years for HS Learners. The reported incidence of LD increased with lower education levels for both Learners and Non-Learners. LHS Non-Learners had an even higher incidence of LD than LHS Learners. Learners and Non-Learners reporting LD were predominantly male, with one exception – PSE Non-Learners tended to more often be female.

Implications from Demographic Findings

Great disparities occurred in the balance of Learners to Non-Learners by education background. The ratio of PSE Learners to Non-Learners (3.4 to 1) is more than twice the HS level (1.28 to 1) and about three times the LHS level (1.14 to 1). These ratios suggest that whether HS and LHS adults pursue purposeful learning may be little better than a coin toss which could go either way, while most adults with PSE continue to learn. Analysis of demographic differences between Learners and Non-Learners at LHS and HS levels identified characteristics that employers, educators, and policy makers could recognize and utilize in efforts to attract Non-Learners to learning.

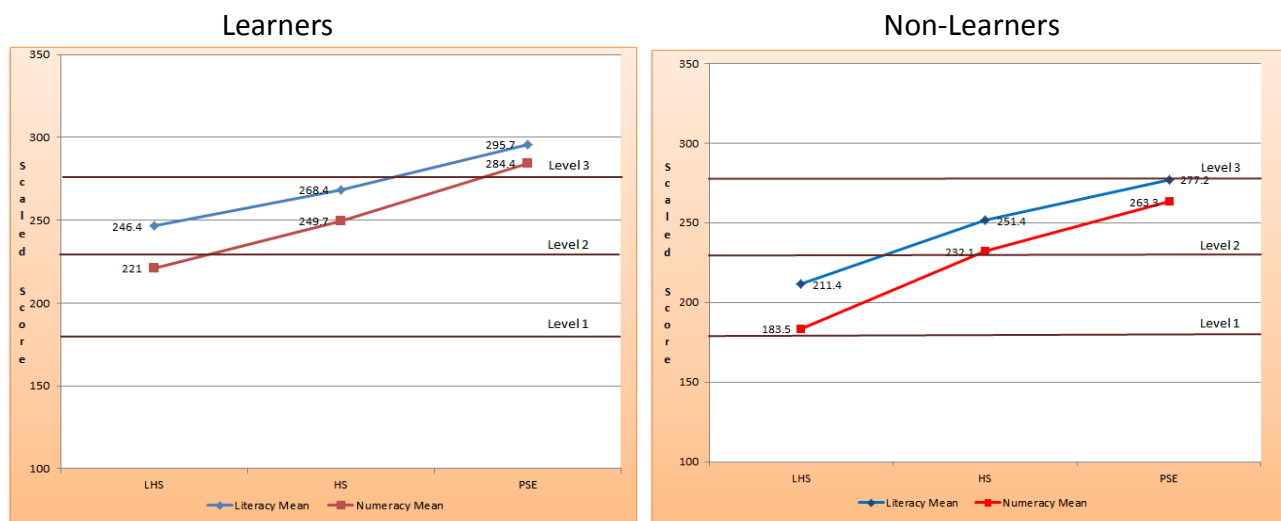
LHS and HS Non-Learners tended to be middle-aged, with the vast majority having spouses/partners and children, according to the findings from Table 1, Figure 2, and Figure 3. They might be male or female but primarily had low incomes. They sometimes faced barriers associated with visual or hearing difficulties and the least educated tended to also report a high rate of learning disabilities. Autor pointed out that long-term effective policies “in raising prosperity and reducing inequality are those that cultivate the skills of successive generations,” (2014, p. 850) including widespread access to PSE and high-quality health and home environments, which could address inequalities between Learners and Non-Learners. Policy efforts targeted to these middle-aged Non-Learners that emphasize improvements to the standard of living for their families as well as raising their skill levels for themselves and for the economy as a whole (Autor, 2014) could be very fruitful.

In order for these efforts to be successful in reaching Non-Learners, however, policies would need to target adults well beyond the traditional 18- to 24-year-old age of most PSE outreach and would need to address potential barriers of low skills, low income, scheduling, and disabilities. Adults returning for PSE may struggle with low skills or be “burdened with debt” (Kis & Field, 2013, p. 13), which can prevent PSE completion and thus access to jobs requiring high skills. Making sure policies are in place so they can pursue learning around their work and family schedules and that they receive accommodation for documented disabilities (Patterson, in press) is also necessary.

Skill Levels

Describing current adult skill levels is integral to a fuller understanding of the role of learning at each education level, especially when skill levels differ by learning status for those with otherwise similar education backgrounds. PIAAC participants were assessed in Literacy, Numeracy, and PSTRE skill areas. In broad skill categories, LHS Learner score means were at Level 2 for Literacy, and at Level 1 for Numeracy (see Figure 4 and Table 2). Both Literacy and Numeracy score means were at Level 2 for HS Learners and at Level 3 for PSE Learners. For LHS Non-Learners, Literacy and Numeracy scores averaged at Level 1 (see Table 3). HS Non-Learners scored at Level 2 for Literacy and Numeracy, on average; PSE Non-Learners tended to score in Level 3 for Literacy and Level 2 for Numeracy. Numeracy scores were the lowest in all three education levels, irrespective of learner status. All Learners had higher mean scores in either skill area than did Non-Learners.

Figure 4. Mean Scores on Literacy and Numeracy by Highest Education Level and Learner Status



In PSTRE, LHS and HS Learners and HS Non-Learners averaged in Level 1 (see Figure 5). LHS Non-Learners averaged below Level 1, in strong contrast with PSE Learners, who averaged at Level 2. Except for those of LHS and HS Learners, all PSTRE means differ significantly. While the overlap of mean scores for LHS and HS Learners indicates Learners with the least education appear to have higher PSTRE skills when learning than do Non-Learners, neither group of Learners averaged above Level 1.

Figure 5. Mean Scores on PSTRE by Highest Education Level and Learner Status

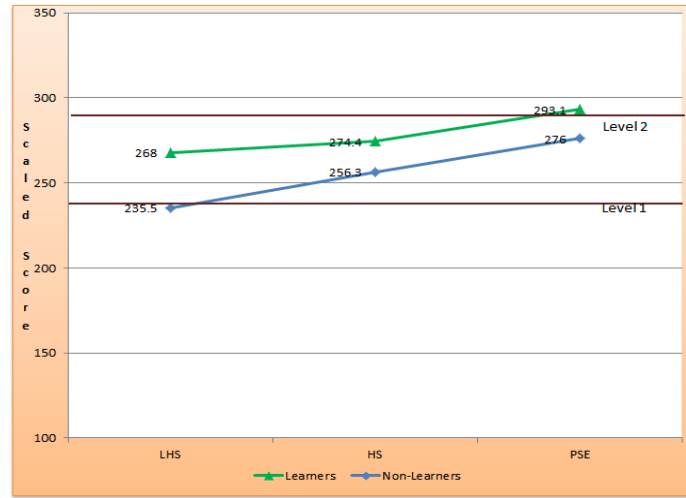


Table 2. Learner Mean Scores on Literacy, Numeracy, and PSTRE by Highest Education Level

Skill Area	LHS		HS		PSE	
	Mean	SE	Mean	SE	Mean	SE
Literacy	246.4	2.7	268.4	1.9	295.7	1.5
Numeracy	221.0	3.0	249.7	2.0	284.4	1.7
Problem Solving in Technology	268.0	3.2	274.4	2.1	293.1	1.7
Percent	12.3	0.3	35.5	0.8	52.3	0.7

Table 3. Non-Learner Mean Scores on Literacy, Numeracy, and PSTRE by Highest Education Level

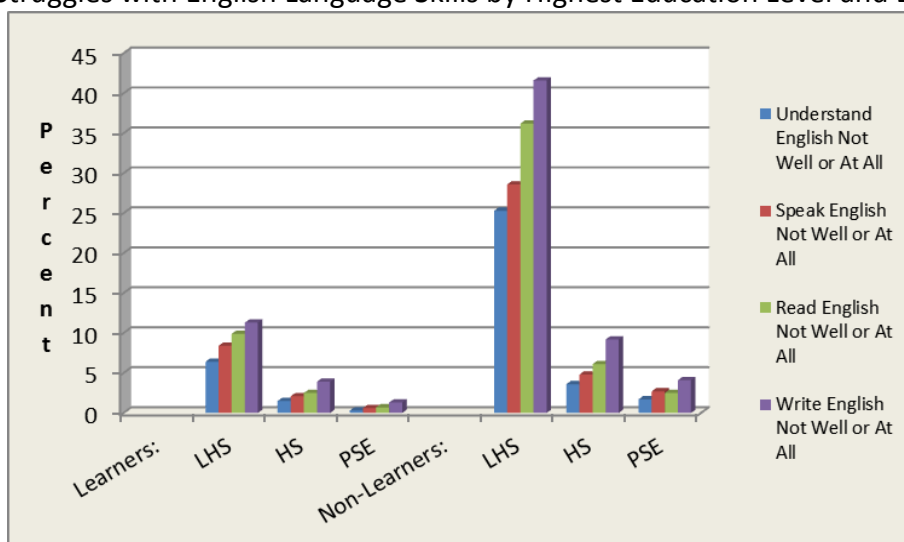
Skill Area	LHS		HS		PSE	
	Mean	SE	Mean	SE	Mean	SE
Literacy	211.4	2.8	251.4	1.8	277.2	1.9
Numeracy	183.5	3.0	232.1	2.2	263.3	2.4
Problem Solving in Technology	235.5	3.9	256.3	1.9	276.0	1.9
Percent	19.3	0.8	51.4	1.0	29.2	1.1

Taken together, these skill level differences indicate that at the LHS level, Learners have stronger skills in Literacy, Numeracy, and PSTRE than their peers who do not pursue learning. The same statement is true for Learners and Non-Learners at the HS level. Differences in mean scores between education levels were large, with one exception; score means of LHS and HS Learners in

PSTRE were close enough that scores from either group could potentially overlap, indicating that technology-related skills of high school completers and non-completers who pursue learning may be similarly low.

In addition to taking PIAAC assessments, adults, whether native English speakers or English Language Learners (ELLs), reported their English skill levels: understanding spoken English along with speaking, reading, and writing English. Overall Learners had much lower rates of struggling with English skills than Non-Learners did (see Figure 6). Moreover, more than a third of LHS Non-Learners could not read nor write English well or at all. LHS Learners and HS Non-Learners, however, struggled with understanding and speaking English at comparable rates. The percentages of reading “not well or not at all” in Figure 6 represent an estimated 7.4 million Non-Learners and 3.1 million Learners. Approximately 9.5 million Non-Learners and 4.3 million Learners cannot write English well or at all.

Figure 6. Adult Struggles with English Language Skills by Highest Education Level and Learner Status



Implications from Skill Level Findings

Describing current skill levels in literacy, numeracy, and PSTRE of PIAAC participants begins to explain the role of learning at each education level, especially where learning differentiates skill levels even for those with similar education backgrounds. The low skills of LHS and HS Non-Learners, whether compared with their Learner counterparts or with PSE adults, point to a major societal issue in the USA. The OECD *Survey of Adult Skills* (2013) cited low literacy and numeracy skills in comparing the weak performance on all PIAAC assessments of U.S. adults with international performance. What begins as a major societal issue in the USA could ultimately imply consequences for future roles the USA takes on internationally.

The significantly large gaps between LHS, HS, and PSE participants revealed a positive relationship between assessed skills and educational attainment, in keeping with previous research (Reder, 2013). Identifying large gaps between Learners and Non-Learners by education level adds to the understanding of these relationships. Framed positively, those who had higher levels of education to begin with and who pursued learning recently tended to have even higher skill levels than those

who didn't pursue learning. The flip side of that relationship is that those who had lower levels of education and did not pursue learning tended to have even lower skill levels, thus positioning LHS and HS Non-learners even further away from PSE Learners and widening the skills gap.

The connection of Literacy scores and learning may in turn relate to adult performance in Numeracy. LHS Learners and Non-Learners were almost a full skill level apart in Literacy and Numeracy scores. From the LHS to HS levels, skill differences between literacy and numeracy, as shown in Figure 4, began to narrow, indicating that literacy and numeracy may inform each other as formal education continues. The tendency for the gap to narrow became even stronger for Learners than for Non-Learners. If the Literacy skills of Non-Learners were raised, the corresponding Numeracy skills would therefore tend to benefit, and vice versa. Policies that address the inequality between adults at these different educational levels via learning show promise to both enable "a larger fraction of adults to attain high productivity" and to raise the "total supply of skills available to the economy" (Autor, 2014, p. 250).

The positive relationship between Literacy scores and learning appears to extend to native speakers of English and to ELLs. Learners indicated that their struggles with understanding, speaking, reading, and writing English were drastically lower than Non-Learners. While the skills gap remains largest for high school non-completers, the reduction of English learning challenges in Learners suggested the potential of learning to make a difference.

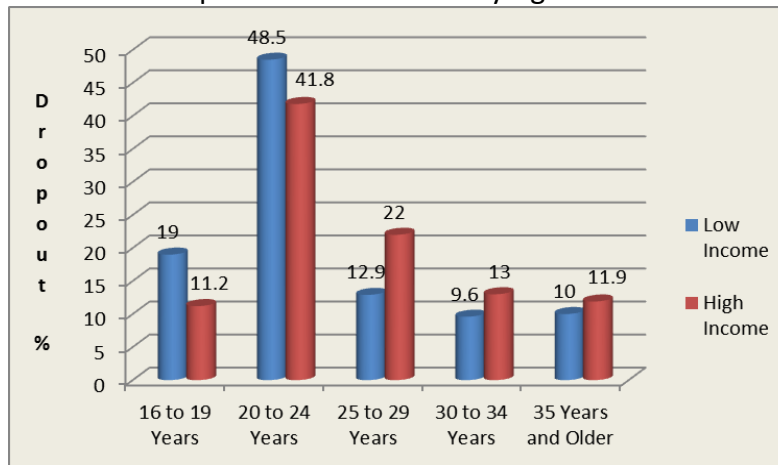
The overlap of mean scores for LHS and HS Learners is a promising sign that Learners with the least education have the potential to raise PSTRE skills through learning, or for those who gain PSTRE skills to become involved in learning. However, neither Learner group averaged above Level 1, which puts all participants with a high school education or less at risk of being left behind technologically. The OECD Technical Report (in press) further "noted that more than a quarter of the PIAAC participants were excluded from the PSTRE survey because they reported no prior experience using computers, they were not willing to take the survey on a computer, or they were not able to demonstrate the basic ICT skills required to complete the assessment such as clicking, highlighting and simple typing" (OECD, in press, p. 526). Adding this sizable portion of the population to the groups averaging at Level 1 or below on PSTRE, it appears that most of the population is using technology to solve problems at a basic level, at best, and could thus benefit from interventions involving technology and learning.

Education Background

More detailed characterizations of education background – when they completed or left school as well as their parents’ education attainment – fill in the descriptions of Learners and Non-Learners. Across all education levels, Learners and Non-Learners alike most frequently completed formal education by age 24. As might be expected, virtually all LHS Learners and Non-Learners indicated ending their secondary experiences by age 19. After age 19, 38.1 percent of HS Learners and 29.4 percent of HS Non-Learners completed high school. Approximately one-fourth of PSE Learners completed by age 25 to 29 and another fourth at an older age.

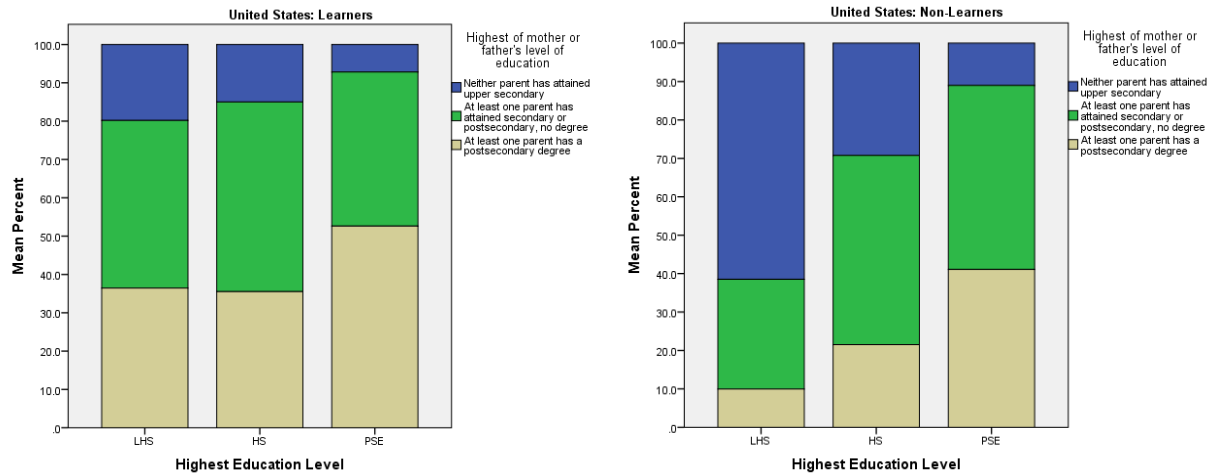
Differences in the age group Learners left education without completing were apparent by income, as shown in Figure 7. Low-income Learners who left education in the 16 to 19 age group without completing did so about twice as often as high-income Learners. Low-income Learners also had a higher rate of leaving education at age 20 to 24 than their high-income age peers but showed more persistence at the next two age levels. By the time adults reached the age of 25 to 29, Learners with low income dropped out at nearly half the rate of their high-income peers at age 25 to 29, and low-income Learners age 30 to 34 continued to drop out less frequently than high-income peers.

Figure 7. Learner Dropout from Education by Age and Income



The majority of Learners came from families where at least one parent completed high school or college. As displayed in Figure 8, a parent of an LHS or HS Learner generally tended to finish high school or college. These figures support the important role of family in encouraging education. In stark contrast, most parents of LHS Non-Learners tended *not* to have finished high school, and only one-tenth had a parent who completed PSE. HS Non-Learners tended to have parents who left before high school completion or who finished high school. Given the median age group of Non-Learners (45 to 49), another potential explanation is that many of their parents went to school in an era in which high school graduation was less common.

Figure 8. Parental Education by Highest Education Level and Learner Status



Implications from Education Background Findings

The findings displayed in Figures 7 and 8 added to the knowledge base on Learners and Non-Learners in PIAAC by education background. For those beyond the age of 25, dropout rates from formal education, particularly for those with low incomes, were low. This finding is in keeping with earlier research that non-traditional aged adults returning to pursue formal learning tend to persist in learning, even though graduation rates are minimal (Patterson, et al., 2010). This persistence presupposes that adults have overcome barriers to start learning (Reder, 2007; Research Allies for Lifelong Learning, 2013) and that once started, deterrents related to low skills and low income (Kis & Field, 2013) were removed.

For adults with less education, getting to further formal learning, however, often depends on the encouragement of parents (Research Allies for Lifelong Learning, 2013), which may be lacking for many LHS and HS Non-Learners. Most of these Non-Learners did not come from family backgrounds with PSE role models, and in many cases their parents may not have graduated from high school, much less college. In the absence of parental role models, they may need to rely on other family members, perhaps even their children, as well as other mentors for encouragement and support to pursue learning (McAnaney, 2009; Patterson, in press). Employers could also play a meaningful role in guiding these LHS and HS Non-Learners to gain new skills (Kis & Field, 2013).

Employment Background

Information on employment background – their employment status, sector, work hours, and job satisfaction – also fills in the picture of Learners and on-Learners (see Table 4). Participation in employment increased with successive education levels. LHS Non-Learners tended to be employed more often and unemployed substantially less often than LHS Learners. LHS Non-Learners experienced a high rate of permanent disability, which may partially explain their lack of learning. LHS Non-Learners had a slightly higher management rate than LHS Learners, and both groups had generally stayed with the same employer within the past five years. LHS Non-Learners also had a high rate of isolation from work and education; 45.4 percent were neither in work nor education (i.e., NEET).

Table 4. Adult Learner and Non-Learner Employment by Highest Education Level

Status	Learners			Non-Learners		
	LHS %	HS%	PSE%	LHS %	HS%	PSE%
Employed	49.2	79.0	88.3	54.6	61.1	63.8
Unemployed	19.2	8.5	4.1	6.9	9.6	8.4
Out of Labor Force	31.6	12.5	7.6	38.5	29.3	27.8
Total	100.0	100.0	100.0	100.0	100.0	100.0
On Permanent Disability	0.9	1.8	1.2	17.0	10.8	7.9
Is Not Employed, in Education, or Training (NEET)	9.2	11.0	7.2	45.4	38.9	36.2
Employer Sector: Private	83.3	76.4	63.0	93.1	87.0	81.0
Employer Size: Median Number Employed	11-50 People	11-50 People	51-200 People	11-50 People	11-50 People	11-50 People
Job Satisfaction: Extremely Satisfied or Satisfied	78.7	75.4	82.1	79.1	76.5	78.0
Employed with Single Employer	90.1	87.0	86.5	95.5	89.3	86.4
Employed and Stayed with Same Employer for 5 Years	55.0	41.9	42.6	61.7	61.5	52.6
Employed and Is A Manager	15.9	31.3	40.8	20.8	26.1	35.7

Overall LHS Learners were employed in small, predominantly private-sector businesses of up to 50 employees and most frequently worked part time (up to 20 hours per week), as displayed in Table 5. LHS Non-Learners also tended to be employed in small, predominantly private-sector businesses of up to 50 employees, and most worked full time (21 to 40 hours per week).

Table 5. Adult Learner and Non-Learner Work Hours by Highest Education Level

Work Hours	Learners			Non-Learners		
	LHS %	HS%	PSE%	LHS %	HS%	PSE%
0 to 20 Hours	44.5	17.4	9.9	10.0	11.3	14.6
21 to 40 Hours	41.3	54.4	45.5	67.2	58.0	48.3
41 to 60 Hours	12.6	25.3	40.4	18.7	26.8	33.2
61 to 80 Hours	1.6	2.2	4.0	4.1	4.0	3.9

In contrast with LHS Learners, 79 percent of HS Learners were employed. As shown in Table 4, HS Learners tended to be managers more often (31.3 percent) than HS Non-Learners (26.1 percent). About one in ten HS Learners was self-employed; HS Non-Learners were self-employed at twice that rate. HS Learners experienced some mobility in employment, with an average 2.4 organizations employing them in the past five years. HS Non-Learners tended to have more stability and to stay with just one organization. HS Learners and Non-Learners most frequently worked 21 to 40 hours, as displayed in Table 5. Overall HS Learners worked in small to mid-size, predominantly private-sector businesses of up to 250 people (77.0 percent). HS Non-Learners, in contrast, tended to work in small, predominantly private-sector businesses (56.3 percent).

A key component of employment is job satisfaction. More than three-fourths of Learners reported being satisfied or extremely satisfied with their jobs (see Table 4). Full-time employees reported substantially higher job satisfaction rates than part-time employees. Non-Learners reported similar rates of job satisfaction as Learners at all education levels. After age 24, adults' job satisfaction rates climbed to more than 80 percent. The range of job satisfaction differed by income level; high-income HS Learners were more satisfied (83.3 percent) than low-income HS Learners (71.2 percent), and differences by income were comparable for HS Non-Learners. Older adults or those with high incomes tended to be satisfied with their jobs more often than younger or low-income adults were.

Implications from Employment Background Findings

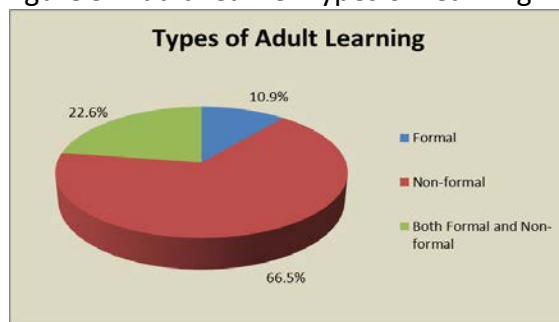
The findings on employment background further characterized LHS and HS Non-Learners as generally satisfied employees working full time in small businesses. They were infrequently in management roles and tended to stay with the same employer. They may work in businesses where few employee educational benefits are available and, with limited skills and prospects, may hesitate to look further, particularly in times of economic uncertainty. A lack of awareness of the connection between learning and career prospects hamper participation in adult learning (Kis & Field, 2013). Not seeing this connection can even contribute to a “vicious cycle” of minimal learning and fewer career opportunities (OECD, 2013, p. 137).

For these Non-Learners, learning through the workplace may be a “promising route” to improved career prospects (Kis & Field, 2013, p. 13). Policies that support small businesses to provide workplace training or external educational benefits could open the door for Non-Learners to boost their career opportunities and enhance their standards of living (Autor, 2014).

Types of Recent Learning

The characteristics and background of Learners provided a backdrop to contextualize types of learning. The second research question addresses types of formal and non-formal learning that Learners report pursuing. Figure 9 displays the proportions of Learners who pursued formal learning, non-formal learning, or both in the 12 months prior to PIAAC participation. The largest group of Learners pursued only non-formal learning – an estimated 77.5 million Learners (66.5 percent) did so. Approximately 12.7 million Learners (10.9 percent) pursued formal learning only. Another 26.4 million Learners (22.6 percent) learned both formally and non-formally in the year before PIAAC.

Figure 9. Adult Learner Types of Learning Pursued



A few noteworthy differences in learning occurred for HS Learners by income and household composition. Low-income HS Learners (35.2 percent) worked and learned at five times the rate of high-income HS Learners (6.1 percent). Whether working or not working, HS Learners in the largest households (i.e., 6 or more people) participated in formal learning at a much higher rate (49.7 percent) than single HS Learners (29.9 percent).

Recent Non-formal Learning

As described earlier, the largest percentage of learning occurring in the past year was non-formal; as shown in Table 6, 83.0 percent of LHS Learners and 84.6 percent of HS Learners learned non-formally. LHS and HS Learners in non-formal learning tended to be men (56.4 percent and 52.2 percent, respectively). Non-formal Learners tended to be older and to pursue even more non-formal learning as they aged; the median age group for non-formal Learners was 40 to 44, versus 25 to 29 for Learners who did not learn non-formally. Universally high, LHS non-formal learning did not differ significantly by income. High-income HS Learners (96.1 percent) participated in non-formal learning even more than low-income HS Learners (85.0 percent). LHS and HS Learners reported putting in about the same amount of time annually (approximately 110 hours) to learn non-formally for job-related reasons.

Table 6. Non-formal Learning by Highest Education Level

Status	Learners		
	LHS %	HS%	PSE%
Non-formal Learners	83.0	84.6	92.7
Gender: Male	56.4	52.2	46.6
Time Spent Learning for Job-related Reasons: Mean	114.5 hours	111.1 hours	113.4 hours
Skill Type (within NFE)			
Apprenticeship	2.5	3.1	1.9
English Language Skills	14.8	12.8	3.6
Adult Basic Skills	24.2	10.5	N/A
High School Equivalency Preparation	12.4	2.1	N/A

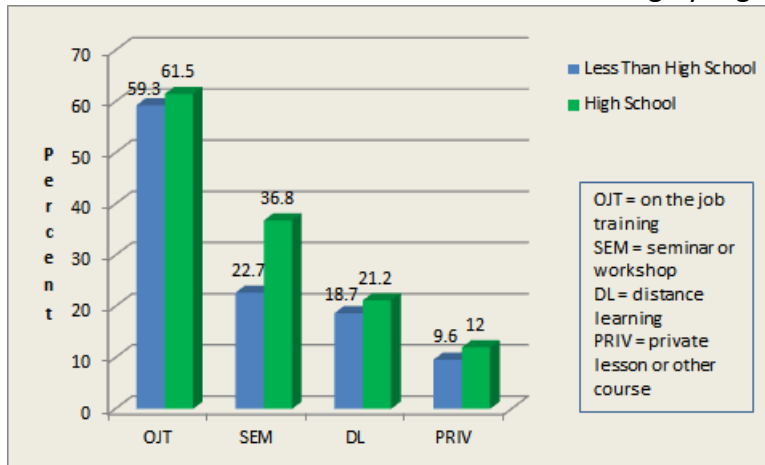
Note: N/A indicates not applicable to postsecondary level

Adult non-formal learning may be differentiated by the types of skills Learners pursued: apprenticeship, English language skills, adult basic skills, or preparation for the GED® test or other high school equivalency. Less than five percent of adults were apprentices; most were reported as Learners, and apprenticeship occurred at all three education levels. Apprentices were predominantly young, male, or low income. Also, in the past year an estimated 1.8 million adults were English language learners (ELLs). Of those ELLs who reported ever learning English as an adult, 34.5 percent reported doing so through an ELL class or tutoring in the past year. The majority of ELLs did so for personal reasons.

Other non-formal learning at the LHS and HS level included gaining basic skills as an adult (ABE), preparing for the GED test (GED Prep), and preparing for other high school equivalency (HSE)^{iv}. More than one-fourth (28 percent) of LHS and HS Learners combined participated in ABE, GED Prep, or HSE. These Learners usually had not graduated from high school; those who completed high school may have been homeschooled, had learning or other disabilities, or had other reasons for learning additional basic skills or pursuing HSE. Of LHS and HS non-formal Learners, an estimated 6 million adults (14.0 percent) reported learning in ABE, 2.4 million in GED Prep (5.6 percent), and 1.9 million in other HSE (4.4 percent).

Learners pursued non-formal learning through a variety of methods. As presented in Figure 10, Learners participated in four major methods of non-formal learning: open or distance education (DL), on-the-job training (OJT), seminars or workshops (SEM), and private lessons or other learning (PRIV). Some learners participated in more than one non-formal method. About three-fifths of LHS and HS Learners who pursued non-formal learning participated in OJT, which was the most prevalent method.

Figure 10. Adult Learner Methods of Non-formal Learning by Highest Education Level



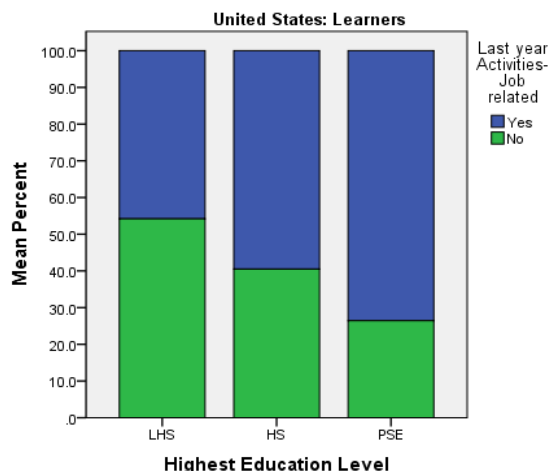
Learners pursuing non-formal learning participated in seminars or workshops next most often, with rates of participation increasing substantially at successively higher education levels; HS Learners (36.8 percent) participated in SEM at a higher rate than LHS Learners (22.7 percent). LHS and HS Learners in SEM most often participated in a single SEM event during the year.

LHS and HS Learners took advantage of distance education or private lessons least often as non-formal learning. Fewer than 1 in 5 LHS Learners (18.7 percent) and HS Learners (21.2 percent) learning non-formally participated in DL. About one-tenth of LHS and HS Learners who pursued non-formal learning took advantage of PRIV.

Which groups found this type of learning useful? Nearly all Learners (more than 90 percent of each Learner level) reported that non-formal learning they participated in was useful. Learners participating in non-formal learning activities tended to have higher rates of employment with successive education levels: 73.7 percent of these HS Learners were employed, as were 54.0 percent of LHS Learners pursuing non-formal learning. The majority of non-formal Learners reported having access to learning opportunities during working hours. Non-formal LHS Learners participated only or mostly during working hours at a rate of 70.3 percent. The corresponding rate was 73.3 percent for HS Learners.

Less than half of non-formal LHS Learners (47.4 percent) reported participating in more than one learning activity in the past year. The majority of HS Learners learning non-formally (64.4 percent) took more than one learning activity. Job-related reasons for non-formal learning include both short-term and long-term reasons, such as to do their current job better, improve their career prospects, or satisfy employer requirements. As displayed in Figure 11, learning became increasingly more job-related as education level rose; half of LHS Learners reported learning non-formally for job-related reasons, in contrast with three-fifths of HS Learners.

Figure 11. Job-Related Reasons for Learning by Highest Education Level



Adults in non-formal learning were also asked why they participated. The reason these Learners most often gave for participating was to do their job better or improve career prospects – 53.8 percent of LHS Learners and 48.2 percent of HS Learners learning non-formally selected this reason. The second most frequent reason was being required to participate, followed by learning to increase their knowledge or skills in an area of personal interest. About one-fourth of non-formal Learners also pursued formal learning – 23.4 percent of LHS non-formal Learners and 27.8 percent of HS non-formal Learners learned formally as well. Of formal HS Learners, 60.5 percent also learned non-formally.

Recent Formal Learning

As might be expected from their overall youth and low skill levels, LHS Learners had a very high rate of participation in formal learning in the past year (74.1 percent). LHS Learners studying formally were predominantly younger than 24 years old (89.8 percent). Nearly all (95.3 percent) were low income, and more than half (54.0 percent) were male. Two-fifths of them worked while learning formally, mostly part time, up to 20 hours per week.

Formal learning rates were much lower for HS Learners (39.1 percent). When asked whether they took courses toward a diploma or degree in the past year, proportionately few HS Learners tended to respond affirmatively (36.2 percent). More than three-fourths of HS Learners who took courses toward a degree or diploma were simultaneously employed while they studied. Many were beyond a traditional age – 33.9 percent of HS Learners studying formally were 25 or older – yet formal learning rates decreased with successively higher age groups. About half (52.0 percent) of HS Learners studying formally were women. The vast majority of HS Learners studying formally tended to have low incomes (85.2 percent). About half of HS Learners worked 21 to 40 hours weekly (51.3 percent) while studying formally. Two-thirds of HS Learners in formal learning found it useful to their jobs.

Implications from Findings on Types of Learning

From the findings on the characteristics of Learners and Non-Learners and the types of learning that Learners pursue, it is apparent that many millions of LHS and HS adults either have not participated in learning recently or have done so at the secondary level or less. Approximately 80 million, or 73 percent of LHS and HS adults, have the potential to pursue formal postsecondary learning yet are not currently involved. While the proportions of overall OJT and ABE participation appear encouraging, the average 110 hours per year of non-formal learning and a low participation rate of HS Learners in formal education are minimal when Literacy, Numeracy, and PSTRE skill gaps loom as large as they do.

Learning via technology was noted as a solution in early PIAAC findings (OECD, 2013). The low incidence of non-formal distance learning (DL) for LHS and HS Learners is a concern, but perhaps not surprising with the low skill levels LHS and HS adults experienced in PSTRE. An advantage of DL, according to initial PIAAC results, is its potential to “allow workers to adapt learning to their lives” (Schleicher, 2013, 80). Given the early findings on the demographics and background of LHS and HS Non-Learners, DL represents a promising means of learning for generally mature adults with families who work full time in small businesses. Policies which encourage growth in digital literacy and DL have the potential to assist these adults in gaining additional skills.

Barriers and Motivators to Learning

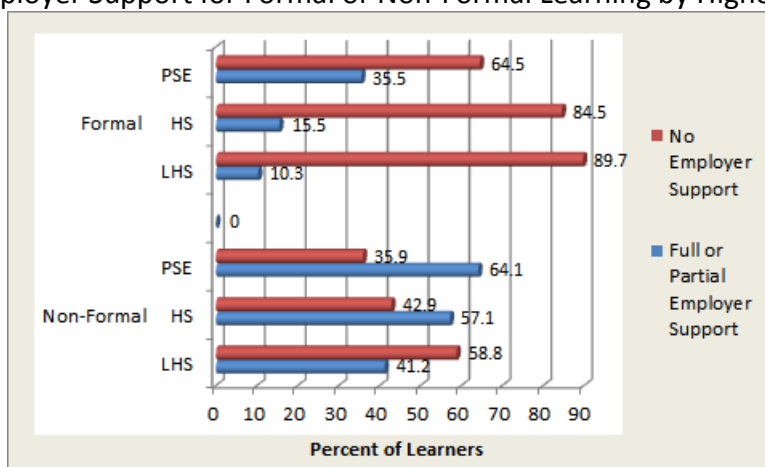
The minimal participation in learning of LHS and HS adults noted in the previous section suggests the presence of barriers and a need to examine reasons that might provide motivation to learn. Research questions 3 and 4 address barriers and motivators to learning for both Learners and Non-Learners by education level. Barriers include costs of learning, lack of time, and individual beliefs about educational requirements. Motivators include both job-related motivators – such as job or career enhancement, workplace sources of learning, job satisfaction, and job stability – and personal interest motives, such as personal reasons and family reasons.

Barriers to Learning

A major barrier to learning is cost, especially for LHS and HS adults who predominantly have low incomes and thus would struggle to afford learning. Employer support refers to an employer paying for some or all costs of participating in formal or non-formal learning. Adults could also designate whether there were no such costs or whether they did not receive report because they were not employed while learning. When employers can provide support to employees to defray the costs of learning, even in part, this barrier can be mitigated or even removed completely.

An estimated 74.1 percent of formal Learners and 39.3 percent of non-formal Learners were faced with the barrier of paying costs for learning without employer support. Figure 11 shows proportions of employer support received by education level (percentages for learning at no cost and learning without being employed are excluded from Figure 12). Although employers provided some support in formal learning for PSE Learners (35.5 percent) who already completed higher levels of education and for their non-formal learning (64.1 percent), a sizable gap in support occurred for the least educated Learners. Support of non-formal learning for LHS and HS Learners was lower, 41.2 percent and 57.1 percent, respectively. The gap widened even further for formal learning, to 10.3 percent for LHS Learners and 15.5 percent for HS Learners. The vast majority of these formal Learners were low-income Learners with little disposable income for formal education.

Figure 12. Employer Support for Formal or Non-Formal Learning by Highest Education Level



The connection of formal learning and employer support is not one of simple convenience to the employee. As noted earlier, adults often learn formally for job-related reasons, such as to do their current job better, improve their career prospects, or satisfy employer requirements. When formal education was job-related, employers of those learning formally tended to provide full or partial support at more than twice the rate (30.6 percent) than when it was not job-related (13.0 percent).

Another barrier to learning, especially for formal learning, is release time. Nearly all HS Learners (89.6 percent) who were employed while in formal education learned primarily outside work. PSE Learners got release time from work for formal education at nearly twice the rate (18.8 percent) of HS Learners (10.3 percent). Non-formal learning activities, on the other hand, tended to occur primarily during work hours for HS Learners (73.3 percent).

Individuals' beliefs about the level of education the workplace requires may also serve as a barrier to further learning; Non-Learners at all three levels of education perceived a need for less education to work in their current positions than the level they already had. Learners generally expected higher education requirements to do their current work than did Non-Learners. LHS Learners (44.0 percent) and HS Learners (72.1 percent) frequently indicated that a high school diploma was required for their work. Fewer LHS Non-Learners (37.5 percent) and more HS Non-Learners (77.1 percent) expected high school diplomas to be required for the same work. These differences indicate that LHS and HS Non-Learners had less of an expectation of needing a high school diploma for their jobs than LHS and HS Learners did.

Job-related Motivators

Adults may be motivated to learn either for job-related reasons or from personal interest motives. As noted earlier, many adult learners participated in learning for job-related reasons, including job or career enhancement, workplace sources of learning, job satisfaction, and job stability. The majority of Learners participated in non-formal learning for job-related reasons and did so more often at higher education levels; 57.9 percent of LHS Learners and 66.9 percent of HS Learners pursued non-formal learning for job-related reasons. Male and high-income Learners tended to pursue non-formal learning for job-related reasons more than female and low-income Learners did. Most Learners who studied formally also did so for job-related reasons; 57.0 percent of LHS Learners and 66.0 percent of HS Learners pursued recent formal studies for job-related reasons.

Three sources of job-related learning were collected in PIAAC data – learning from co-workers or supervisors, learning by doing at work, and learning to keep up to date at work. Learning from co-workers or supervisors is one indicator of the extent to which adults are engaged in learning about their jobs or even their career fields. Overall HS Learners benefitted in learning from their co-workers or supervisors more than LHS Learners did. LHS Learners reported learning from their co-workers or supervisors at work monthly, on average; HS Learners endorsed an average weekly learning from co-workers or supervisors. The rate of Learners benefitting from co-worker or supervisor training did not vary by income.

LHS and HS Learners who pursued formal learning, HS Learners who did not participate in non-formal education, and Non-Learners of all education levels tended to experience learning from co-workers and supervisors monthly on average. These data point to Non-Learners and Learners at lower education levels as being less engaged in workplace learning, particularly as the latter group pursues formal learning, and Learners at higher levels of education being more engaged in workplace learning, whether in formal education or not.

A second indicator of engagement in learning at work is learning by doing. A majority of Learners (58.8 percent of LHS Learners and 70.1 of HS Learners) reported daily or weekly learning by doing at work. LHS and HS Learners who worked full time reported daily learning by doing, on average. For Non-Learners of all education levels, the highest percentages of learning by doing occurred daily.

On average, LHS Learners (39.4 percent) learned to keep up to date, the third indicator of engagement in workplace learning, less than HS Learners (59.2 percent). On average LHS Learners learned to keep up to date at work monthly, while HS Learners tended to do so weekly. HS Learners pursuing formal education tended to keep up to date on the job less often, with an average of monthly learning. Non-Learners also indicated monthly learning, on average, to keep up to date at work, regardless of education level.

Job satisfaction (i.e., being satisfied or extremely satisfied with their jobs) is another potential motivator for learning, especially for those pursuing formal education. HS Learners who were primarily full-time employees tended to be more often satisfied with their jobs (79.0 percent) while HS Learners who were primarily in formal education tended to be satisfied less frequently (67.0 percent). Increased job satisfaction also seemed positively associated with non-formal learning. Most HS Learners pursuing non-formal learning were satisfied or extremely satisfied with their jobs (76.8 percent). More than three-fourths of Non-Learners were satisfied with their jobs, regardless of education level.

The last job-related motivator is job stability. Employees with concerns about the stability of their jobs may move to other companies or may seek further education to cushion any future loss of employment in an unstable economy. Alternatively, employees who are focused on learning may need to change jobs to get working conditions or a work schedule that allows time for learning. Learners at higher education levels who pursued learning indicated changing jobs one or more times in the past five years. HS Learners tended to work in companies experiencing growth (25.0 percent) and tended to change employers more readily (58.1 percent had two or more employers in five years), whereas HS Non-Learners appeared to be in companies experiencing less growth (18.1 percent) and generally remained there within a five-year period (40.6 percent had two or more employers in five years).

Personal-interest Motivators

In addition to job-related motivators, adults learn for reasons of personal interest, such as personal and family reasons. A small proportion, 20.4 percent of LHS and 15.8 percent of HS Learners in non-formal learning, did so for personal reasons. Having a spouse or partner and having older children benefitted non-formal learning participation for HS Learners, but a larger household size did not. Families may also serve as a motivator to participate in formal education. Simply having a spouse

or partner was negatively associated with formal learning; 23.8 percent of HS Learners with partners learned formally, versus 60.0 percent of HS Learners without partners. However, formal learning participation increased as household size expanded for HS Learners – from 32.9 percent of HS Learners in two-member households to 49.7 percent of HS Learners in households of six or more.

Implications from Findings on Barriers and Motivators

Following initial PIAAC analyses, Schleicher noted institutional barriers related to the transparency of educational systems and to employer support for learning – either with costs or with flexible work schedules – especially for employees with low skills (2013). Further analyses conducted in this paper indicated some employer support for non-formal learning and very little support for formal learning. Overall, release time was primarily available only for non-formal learning. To compound the issue, employer support was most lacking for adults at the lowest education levels, who need it the most.

If adult learners see how learning translates into securing better jobs, higher salaries, or promotions, then learning becomes very relevant (Ginsberg & Wlodkowski, 2010; Schleicher, 2013). LHS and HS Non-Learners may not yet have all the pieces together to connect non-formal learning or workplace interactions with getting ahead in their careers. Compared with Learners at higher education levels, Learners at the lowest education level participated significantly less in non-formal learning and learning from co-workers, supervisors, and to keep up to date less frequently. Policies that encourage non-formal learning in the workplace, and particularly opportunities for networking and collaborative learning, could help these Learners see the relevance of learning to their daily work life and for future career prospects.

Early PIAAC findings pointed to a connection between learning and employee mobility (Schleicher, 2013); this paper found little mobility for employees with low education levels. In earlier generations, job stability implied staying with a single employer and rising through the ranks; in the current economy, changing jobs to a position requiring higher skill levels may be the only way to move up in a career (Carnevale, Smith, & Strohl, 2013). LHS and HS Non-Learners, facing an employment future with limited skills and prospects, may hesitate to look further, particularly in an economic downturn. Their lack of awareness of the connection between learning and career prospects not only hampers their participation in adult learning (Kis & Field, 2013), as mentioned earlier, but also keep them from potentially brighter opportunities with a new employer.

Predicting Participation in Formal and Non-formal Learning

The fifth research question considers factors that predict adult participation in formal or non-formal learning. Logistic regression models were designed to first control for gender, age, and income, which were important fixed factors in the literature, in the first block of the hierarchical logistic regression. Initial factors from the literature believed to be malleable were: job relevance, as represented in job stability, and family factors, as represented by household size and partner status. Additional factors for formal learning were job satisfaction, education required for the current job, and workload, represented by weekly hours worked. These initial and additional factors were entered as a second block for formal learning. Additional factors for non-formal learning substituted in the second block were in-work status, learning engagement at work (with co-workers / supervisors or to keep up to date), and life barriers, including work and family responsibilities, cost, and inconvenience.

Four regression models predicted likelihood of participation in formal or non-formal learning for LHS and HS levels. Separate models were developed because participants in each level appeared to form a separate sub-population, and it was expected that models would classify participation differently by level. Partner status, in-work status, and the four life barriers were not included in the LHS non-formal model because of multi-collinearity and singularity in the data for this group.

The best overall classification for formal education occurred at the LHS level (see Table 7) – the model correctly predicted 81.2 percent of participants would go to formal education, Nagelkerke $R^2 = .63$, adjusted $X^2 = 37.3$, $p < .001$. After controlling for gender, age, and income, the best predictors of formal learning at this level were current job education requirements and workload. Adults at the LHS level were more likely to pursue formal education if they perceived a higher education requirement for their current job than what they had; those who thought the job required a college degree were more than 12 times as likely to be in formal education. LHS-level adults working 21 to 40 hours weekly or more than 40 hours weekly were much less likely to learn formally than part-time employees (i.e., working 0 to 20 hours weekly), and those who worked 21 to 40 hours were least likely to do so.

Table 7. Logistic Regression for Likelihood of LHS Formal Learning

Variables	B	SE	Design Effect	Likelihood Estimate	Odds Ratio	95% Confidence Interval
Gender ^c	.41	.49	1.05	1.51	^c	
Age (5 Years) ^c	-.69***	.17	.95	.50	^c	
Monthly Income ^c	-.31	.87	.88	.73	^c	
Household Size	.57	.37	.60	1.76	NS	
Partner Status	-.50	.46	.70	.61	NS	
Number of Organizations	.67	.44	.75	1.96	NS	
Job Satisfaction	-.11	.59	.92	.90	NS	
Current Job Education Requirements (HS or college)	-2.49*	1.0	.49	.08	2.3	.79 to 6.4
		.85				

Variables	B	SE	Design Effect	Likelihood Estimate	Odds Ratio	95% Confidence Interval
degree)	-1.68*		.38	.19	12.1	1.6 to 92.2
Workload (21 to 40 hours or more than 40 hours)	1.64**	.82	1.17	5.15	.20	.07 to .60
	.04**	.67	.93	1.05	.19	.04 to 1.0

Notes: ^c indicates a control variable in the model. * p < .05; ** p < .01; *** p < .001. n = 201.

A second model, for adults at the HS level, correctly predicted 60.3 percent of participants would learn formally, Nagelkerke $R^2 = .48$, adjusted $X^2 = 87.6$, $p < .001$, and after adjusting for gender, age, and income, the strongest predictors were partner status and workload (see Table 8). Like their LHS counterparts, HS-level adults working 21 to 40 hours weekly were much less likely to learn formally than part-time employees (0 to 20 hours weekly), and the effect was even weaker for those who worked overtime (more than 40 hours weekly). Married or partnered HS-level adults also had a much lower chance of pursuing formal education than single adults did.

Table 8. Logistic Regression for Likelihood of HS Formal Learning

Variables	B	SE	Design Effect	Likelihood Estimate	Odds Ratio	95% Confidence Interval
Gender ^c	.61*	.25	1.44	1.83	^c	
Age (5 Years) ^c	-.56***	.08	1.36	.57	^c	
Monthly Income ^c	.16	.32	1.18	1.17	^c	
Household Size	-.06	.24	1.43	.94	NS	
Partner Status	-.50*	.25	1.38	.61	.61	.37 to .99
Number of Organizations	-.02	.24	1.14	.98	NS	
Job Satisfaction	-.18	.31	1.83	.84	NS	
Current Job Education Requirements (HS or college degree)	-.63	.47	.88	.53	NS	
	-.38	.41	1.16	.68		
Workload (21 to 40 hours or more than 40 hours)	1.74***	.42	1.2	5.71	.26	.13 to .51
	.38***	.30	1.02	1.47	.18	.08 to .40

Notes: ^c indicates a control variable in the model. * p < .05. *** p < .001. n = 913.

For non-formal learning, the same set of control variables entered the three educational level models, with predictors representing in-work status, learning engagement at work, and life barriers. Models for HS and LHS levels exhibited extremely poor classification accuracy and model effects; thus results are not displayed.

Implications from Regression Findings

The regression findings indicated that job requirements and workload predicted participation in formal education for LHS Learners, with part-time employees and those who saw their jobs as requiring college most likely to be in formal education. A part-time workload was also predictive for HS Learners to participate in formal education, and partnered HS Learners were less likely to participate. How then can the workplace assist employees with low educational levels – especially those who perceive their education as not being sufficient for the job they currently have – to carve out time from the workload to pursue formal learning (Schleicher, 2013)? Since OJT was the most frequent method and DL the least frequent method of learning for adults at LHS and HS levels, workplaces could collaborate with adult and continuing educators to meet employee training needs by offering more online learning in an OJT context. If conducted well, combining OJT and online education has the potential to promote an organizational learning culture and benefit both the organization and participants economically (Peterson, 2010).

Summary of Findings

Before discussion of results, a brief summary is provided of the most salient findings on adult characteristics, background, learning types, barriers, motivators, and predictors. Approximately 60 million adults were designated Learners - an estimated 8 percent of adults at the LHS level and 23 percent at the HS level. Regionally, Learners in the Northeast USA tended to complete the most education; among Non-Learners, the South had the highest proportion of LHS and HS Non-Learners. The reported incidence of learning disabilities increased with lower education levels. Non-Learners had higher rates of visual and hearing difficulties than Learners. The majority of LHS and HS Learners and Non-Learners earned a low income.

The paper contributed new findings about adult age, income, and family background by learning status. Non-Learners were older than Learners overall. Low-income Learners who left education in the 16 to 24 age group without completing did so at a higher rate than their high-income age peers. By the time adults reached the age group of 25 to 29, low-income Learners showed higher persistence than high-income Learners. Parents of an LHS or HS Learner generally tended to finish high school or college whereas most parents of LHS Non-Learners tended *not* to have finished high school and HS Non-Learners tended to have parents who left before high school completion or who finished high school.

Analyses of employment, management, and job stability statuses were another contribution of the paper. Participation in employment increased with successive education levels. LHS Learners were unemployed at higher rates than LHS Non-Learners. LHS Non-Learners experienced a high rate of permanent disability and NEET, were seldom in managerial roles, and generally stayed with the same employer. Most HS Learners and Non-Learners were employed. HS Learners tended to be managers more often and to experience more job mobility than HS Non-Learners and LHS Learners and Non-Learners. HS Learners and Non-Learners and LHS Non-Learners most frequently worked full time; LHS Learners tended to work part time.

The paper identified major differences in assessed skills of Literacy, Numeracy, and PSTRE by learning status. When PIAAC participants were assessed in Literacy, Numeracy, and PSTRE, Numeracy had the lowest score means overall, irrespective of learner status. All Learners had higher mean scores in each respective skill area than did Non-Learners. LHS Learners averaged at Level 2 for Literacy, and at Level 1 for Numeracy. Literacy and Numeracy score means were at Level 2 for HS Learners and HS Non-Learners. LHS Non-Learners averaged at Level 1 in Literacy and Numeracy. Technology-related skills of high school completers and non-completers who pursue learning and HS Non-Learners appear to be similarly low, at Level 1 on average. LHS Non-Learners had the lowest PSTRE scores, below Level 1 on average. Differences in mean scores between education levels were also large. Non-Learners reported struggling more with English skills than Learners.

Differences in pursuit of non-formal and non-formal learning were also noted and discussed. Two-thirds of Learners pursued only non-formal learning. Approximately one tenth of Learners pursued formal learning only. Another fourth learned both formally and non-formally. Low-income HS Learners worked and learned at much higher rates than high-income HS Learners. Non-formal learning became increasingly more job-related as education level rose. More Learners participated in non-formal learning as education level and age increased.

The paper further contributed detail on the methods of learning for those with a high school education or less. OJT was the most prevalent of four methods of learning for LHS and HS Learners. LHS and HS Learners participated in seminars or workshops next most often. LHS Learners participated least often in seminars and workshops, private lessons, and in distance education. An estimated 6 million adults (16.3 percent of LHS and HS Learners) reported learning in ABE, 2.4 million in GED Prep (6.4 percent of LHS and HS Learners), and 1.9 million in other HSE (5.3 percent of LHS and HS Learners).

Though formal learning was generally considered useful to employed adults, most adults with a high school education or less did not pursue formal postsecondary learning. Approximately 80 million, or 73 percent of LHS and HS adults, have the potential to pursue formal postsecondary learning yet are not currently involved. Most HS Learners worked while they studied formally yet had low incomes, and more than half were women. Most HS Learners found studying formally useful to their jobs. LHS Learners had a high rate of formal learning compared with HS Learners.

The paper also identified barriers to learning, including lack of employer support for formal learning. Barriers to learning included cost, lack of release time, and beliefs about education requirements for current jobs. Although employers provide more support for non-formal learning overall and for PSE Learners who had already completed formal education, a huge gap in support, especially for formal learning, occurs for the least educated Learners, who tend to have low incomes.

Nearly all formal Learners who were employed learned primarily outside work hours. PSE formal Learners who did get release time from work did so at nearly twice the rate of HS formal Learners. Non-formal learning activities, in contrast, tended to occur primarily during work hours for HS Learners.

Motivators included job/career enhancement, workplace sources of learning, job satisfaction, job stability, and personal and family reasons. HS Learners had higher rates of job-related motivation for formal and non-formal learning than LHS Learners did. HS Learners reported more frequent learning from co-workers and supervisors, learning by doing, and learning to keep up to date than LHS Learners. Having a partner or older children benefitted non-formal learning participation for HS Learners. Having a partner was negatively associated with formal learning, yet participation increased as household size expanded for HS formal Learners.

A final contribution of the paper was identifying predictors of formal learning for LHS and HS Learners, namely perceived education requirements, workload, and partner status. In a regression model, predictors of learning for HS-level adults were partner status and workload. HS-level adults working full time or overtime were much less likely to learn formally than part-time employees. Partnered HS-level adults also had a much lower chance of pursuing formal education than single adults did.

Discussion

Adult participation in purposeful learning appears to have increased since the early years of the 2000's, rising from 90 million adults learning formally and non-formally, as cited in Ginsberg and Wlodkowski (2010), to nearly 126 million. However, PIAAC findings in this paper indicate many Learners already have postsecondary degrees, and approximately 73 percent of those who don't, representing 80 million LHS and HS adults, are not pursuing formal PSE. These 80 million adults represent an enormous amount of human capital that is not being tapped.

Participation in adult learning, however, has not grown evenly by education level or income. The data on adult skills in Literacy, Numeracy, and PSTRE point to a great need for learning among LHS and HS adults. Those with low incomes – including the “working poor” – continue to face barriers of cost and access (Ginsberg & Wlodkowski, 2010; U.S. Department of Labor, 2013) even as many of them attempt formal learning (Almeida, Johnson, & Steinberg, 2006). A gap exists between the educational haves and have-nots. It appears that those who most need support for further learning – the least educated and the poorest – have access to the fewest resources, while those with postsecondary degrees have the highest incomes, the most release time for learning, and the most employer support to cover learning costs.

Implications for the Workplace

This gap in access and support has critical implications for the workplace, formal and non-formal adult and continuing education, and policy makers. Beginning with the workplace, many employers clearly found ways to engage a large portion of their employees in job-related non-formal learning. Many more Learners report learning non-formally than formally. Those who do learn tend to

be more often female and older than the traditional college age, to live off low incomes, and to pursue purposeful learning in addition to working full-time (Hansman & Mott, 2010).

Still, many Non-Learners and Learners at low education levels are less engaged in workplace learning than employees with college degrees. Employers need to support learning not just for those who are college-educated already (Ginsberg & Wlodkowski, 2010; Hansman & Mott, 2010) or have a high income that makes learning easily accessible but for employees at all education levels and in all income brackets (Carnevale, Smith, & Strohl, 2013). Elevating skill levels of all employees is necessary to enhance their future earnings capability and has benefits to society and the economy (Reder, 2012). The gap between the educational haves and have-nots should shrink, not widen.

Accordingly, employers can consider ways to change the status quo of Non-Learners and Learners at lower education levels being less engaged in workplace learning. Schleicher (2013) claimed that strong-performing countries emphasize how learning, relative to skill development and relevance, can be linked to work. One solution may be working with in-house trainers and mentors to help employees find clear pathways to rise in the workforce and attempt learning a step at a time (Research Allies for Lifelong Learning, 2013). Another solution is supporting employees to gain a series of stackable credentials along that path (Carnevale, Smith, & Strohl, 2013).

Adults with low education levels are not the only ones who face barriers to purposeful learning; employees at all education levels may face barriers to learning. Overcoming inconvenient times or locations for non-formal learning may be one of the easiest barriers for college graduates to overcome, according to PIAAC data, but other common barriers such as work demands, costs, and family responsibilities persist. Employers and employees from all education levels could work together on taskforces to discuss barriers and explore potential solutions at a local level.

Also, changing demographics related to gender and age offer potential learning opportunities in the workplace. After considering any local access differences by gender, employers could establish programs to encourage more women to participate in non-formal learning and more men with low education levels to pursue formal studies. These programs need to include adequate release time to facilitate learning for employees who have little or no postsecondary experience. Additionally, as the nation ages and older, highly educated employees start to retire (Schleicher, 2013), the economic future of many businesses may become threatened. Workplaces can encourage experienced, highly educated employees to mentor and coach younger, less established employees toward more learning and even greater engagement in the workplace.

Implications for Adult and Continuing Education

The potential pool of adult learners with LHS- or HS-level education is huge, and adults in both levels tend to have similarly low technology skills as well as low levels of education for workforce needs. The importance of adult learning for keeping up skills grows as adults get further away from secondary education (OECD, 2013). In fact, without further education beyond the high-school level, the prospects for getting out of a low-income bracket look very bleak. The overwhelming majority earn low incomes so presumably cannot afford much further education without debt. Findings in this study point to a great need for formal learning support for the lowest-level Learners and HS Learners who may have delayed beginning formal learning because they needed more time to negotiate life barriers or to save up money to pay for it (Carnevale, Smith, & Strohl, 2013; Research Allies for Lifelong Learning, 2013).

Formal postsecondary efforts to recruit them by pointing to the benefits for their careers and their families might go a long way. Adult and continuing education providers could also collaborate with employers to get more instruction during work hours and more tuition costs covered. Programs could also combine academic instruction and workplace learning so that adults get both learning and workplace experience – for example, combining career-technical education with OJT. If the association of job mobility with more non-formal education holds for college graduates, educators can take advantage of that mobility by connecting with employers to provide training for new employees or by connecting directly with transitioning employees with college degrees who see the value of learning for getting their next job.

Implications for Policy Makers

Even the strongest employer and educator efforts to shrink the gap between the educational haves and have-nots will have limited success if policies are not in place to bolster those efforts. Workplace, postsecondary institution, and legislative policies must address the gap also. Employers should examine policies related to benefits and employee learning for potential barriers and make any revisions necessary to ensure all employees have access to and support for learning. Employers with concerns that better educated employees will simply move on can consider policies that support learning with specific continued lengths of employment, so that both employees and the workplace benefit from employer investments in training.

Postsecondary institutions need to review their policies associated with formal and non-formal learning for adults with low education levels, with a special eye toward serving low-income adults, men who became disengaged from education at earlier ages, and adults with learning disabilities. Policies oriented toward traditional students which inadvertently raise barriers for non-traditional adult learners should be replaced. Since the least educated also frequently report learning disabilities,

they likely face a lengthy process to be considered eligible for accommodations and may experience uneven faculty or administrative reactions to providing accommodations once approved. Policies need to ensure full and speedy access to accommodations for diagnosed adult learners to eliminate disability-related barriers to starting and completing PSE programs. Current adult learners from these subpopulations could provide feedback into how policies affect their learning experiences.

Legislative policies are perhaps the most crucial of all. Adult learning in PIAAC is clearly associated with adults' jobs. What incentives can federal or state lawmakers give to employers to support adult learning that is job related? What further financial support can federal and state lawmakers provide to individual adults from low education levels to ensure they can afford to persist in learning, not only to meet their individual learning goals, but also to ensure they can be competitive in the workforce? Policies that support small businesses to provide workplace training or external educational benefits could open the door for Non-Learners to boost their career opportunities and enhance their standards of living (Autor, 2014).

As employees who frequently work full time, most adult learners must pursue learning on a part-time basis. Federal and state policies and financial aid programs need to be more adult-friendly. Federal and state financial aid programs need to lower the eligibility requirements for part-time adult learners and have special policies in place to provide designated funding or expand existing funding opportunities to include part-time adult learners.

As much of the workforce of adults with postsecondary degrees begins to retire, the future pool of employees will be filled with numerous adults with a high-school level education or less. Policies designed to shrink the educational gap and ensure these adults have learned the skills to thrive in the workplace will benefit both individuals and the American economy at large.

Limitations and Recommendations for Future Research

The results from the analyses of PIAAC data on formal and non-formal adult learning are descriptive and predictive only; no causality is intended or inferred. Moreover, cell sizes restricted the number of analyses that could be conducted – for example, disaggregating LHS Learners vs. LHS Non-with stability was often difficult, as was disaggregation of adults pursuing ABE, GED Prep, and HSE learning. Employing public-use data in the analyses meant that individual differences could not be examined; the greater level of precision could benefit future predictive studies especially. In future regression models, additional factors need to be considered to more thoroughly predict non-formal learning.

Future research could focus on deeper investigation of skill levels in Literacy, Numeracy, and PSTRE for subpopulations identified within PIAAC. For example, findings indicated Literacy scores and

learning may in turn relate to adult performance in Numeracy. More research on the relationship of Literacy and Numeracy skill levels to learning would be informative to educators, especially if disaggregated by subpopulation. Another recommendation is to further examine the skill levels of LHS or HS adults who are beyond an age of compulsory school attendance. Also, the significantly large gaps between Non-Learners and Learners reveal a positive relationship between Literacy scores and learning, which appears to extend to native speakers of English and to ELLs. How do skill levels in the three areas differ for ELLs who are Learners or Non-Learners?

The PIAAC findings offer much information about the types of non-formal learning that adults pursue, and this paper has focused especially on non-formal learning related to the workplace. Future researchers could also further explore the relationship between job satisfaction and learning qualitatively – in what ways employees are content with their jobs and how that contentment relates to their understanding of the need for learning in the workplace.

With millions of LHS and HS adults having the potential to pursue formal postsecondary learning yet not getting involved, PIAAC results also indicate age, gender, and income as important factors. Future research should identify successful formal education models that are designed with the needs of low-income adult learners in mind, in terms of age and gender. These models need to address potential barriers of low skills, low income, scheduling, and disabilities. Formal Learners are often female – what barriers do they face to degree completion? How can more males, particularly those who did not complete high school, be re-engaged in formal learning? Research is recommended on their needs, and on the services that support them in successful adult learning. Effective models offering comprehensive services for adult learners need further research; services may include specialized advising, study skills workshops, compressed or accelerated course formats, childcare, and opportunities to network with other adult learners.

The low incidence of non-formal distance learning (DL) for LHS and HS Learners may relate to low skill levels they experienced in PSTRE. DL represents a promising and flexible means of learning (Schleicher, 2013) for generally mature adults with families who work full time in small businesses, as found in this paper. A more in-depth investigation of PSTRE skill levels and DL would offer educators, employers, and policy makers further insights into how to raise PSTRE skills and expand the use of DL.

An additional recommendation for future research is more in-depth study of Non-Learners. While this paper has contributed some basic information about their characteristics and skills, it would be very informative to employers and educators alike to know more, in order to motivate them toward learning and retain them once they start.

The role of family in learning is an area ripe for further research. An intriguing PIAAC finding is that numerous LHS and HS Non-Learners did not come from family backgrounds with PSE role models, and their parents may not have graduated from high school, much less college. A deeper investigation

into their characteristics, backgrounds, and skill levels would be informative to educators, counselors, and policy makers. A final recommendation for future PIAAC research is a more detailed study of the relationships of family composition and household size to learning, especially formal learning.

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ⁱ Monthly income includes bonuses for wage and salary earners and self-employed adults and was organized into deciles.

ⁱⁱ Regions of the USA are based on states within US Census regions (see https://www.census.gov/geo/maps-data/maps/pdfs/reference/us_regdiv.pdf) and were determined from participants' addresses.

ⁱⁱⁱ Educational categories for formal and non-formal education are not mutually exclusive; that is, the adult could participate in either formal or non-formal education, or both.

^{iv} Because of small cell sizes, which could lead to unstable estimates, ABE, GED prep, and HSE learning were not further disaggregated.

Appendix
PIAAC Participant Descriptives

Table A1. Overall Participant Characteristics

Characteristic	Percent (%)
Region: Northeast	18.1
Region: Midwest	21.6
Region: South	36.9
Region: West	23.4
Age: Median	40-44 Years
Gender: Female	50.9
Income: Median Monthly (\$)	2423-3000
Difficulty Seeing	11.4
Difficulty Hearing	8.7
Learning Disabilities	8.0

Table A2. PIAAC Participant Skill Levels

Skill Assessed	Score Mean (Standard Error)	Level
Literacy	270 (1.0)	2
Numeracy	253 (1.2)	2
Problem Solving in Technology-Rich Environments (PSTRE)	277 (1.1)	1

Table A3. Education Background and Participation of PIAAC Participants

Education Status	Percent (%)
Education Completed	
Less Than High School	14.7
High School	41.1
Postsecondary Degree	44.2
Total	100.0
Formal Education in Past Year	24.9
Non-formal Education in Past Year	56.2
Started Program of Study without Completing	31.3

Table A4. Employment of PIAAC Participants

Status	Percent (%)
Employed	73.9
Unemployed	7.9
Out of Labor Force	18.7
Total	100.0*
On Permanent Disability	4.9
Is Not Employed, in Education, or Training (NEET)	13.8
Employer Sector: Private	74.2
Employer Size: Median Number Employed	11-50 People
Job Satisfaction: Extremely Satisfied or Satisfied	78.9
Employed with Single Employer	87.7
Employed and Stayed with Same Employer for 5 Years	48.0
Employed and Is A Manager	33.7

Note: * percentages may not sum to 100% due to rounding of complex sampling estimates.