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# Adults' Readiness to Learn and Skill Acquisition and Use: An Analysis of PIAAC

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**Abstract:** This study examined the relationship between adults' readiness to learn (RtL) and skill acquisition and use in the US sample of the PIAAC. RtL showed significant effects on each of the observed skill use outcomes. It was the strongest predictor of reading and writing skill use at home.

Studies of the cognitive and social correlates of learning skills--particularly skills such as reading and problem solving–are voluminous in the educational and psychological literature (Ackerman & Lohman, 2006; Stanovich, 1986). Thus, it would seem that there are few correlates that have not been extensively examined within various populations. However, data from a recent international assessment of adults' skills make possible new investigations into the relationship of variables that previously have not been studied to skill acquisition among adults. One such variable is readiness to learn.

Do adults typically enter into learning situations prepared to learn? That is, do adults possess sufficient motivation for the learning task, have the cognitive skills and learning strategies necessary to aid their learning and understanding, feel curious and interested in learning, and believe that they can solve problems that they encounter when attempting to learn something? Such characteristics would seem to be important in most situations in which adults are learning skills or acquiring knowledge to fulfill a variety of purposes and needs in life--for work, family, and social interactions with others and so on. The significance of adults' readiness to learn is at the heart of our investigation. The purpose of our study, therefore, was to analyze data from the U.S. sample of the Program for the International Assessment of Adult Competencies (PIAAC), with the aim of examining the importance of readiness to learn in adults' literacy skills as well as their uses of these and other important skills in different contexts.

Our study analyzed whether Readiness to Learn (RtL), a composite variable found in the Background Questionnaire of the PIAAC, predicted (a) the three PIAAC-developed skill outcome measures (i.e., Literacy, Numeracy, and Problem-Solving in Technology-rich Environments [PS-TRE]), and (b) PIAAC-derived indices of skill use at home and at work (e.g., use of reading skills at home and at work, use of numeracy skills at home and at work).

## Review of Literature

The PIAAC Survey of Adult Skills is one in a series of large-scale surveys that have attempted to depict the state of adult literacy internationally and the ramifications this may have for adults' competitiveness in the labor market and participation in the workplace. Results from this survey corroborate other studies that have found that the United States is falling behind in terms of the skills needed for the workplace (U.S. Congress Joint Economic Committee, 2012).

But PIAAC goes beyond this, to ask what skills are used in the workplace and at home, and it investigates levels of these skills employed in these settings. Recent studies of the PIAAC data have looked at these skills in terms of human capital dimensions such as relationships to earnings (Hanushek et al., 2013), educational level (Soares & Perna, 2014), and the mismatch between skill acquisition and use (Allen, Levels, & van der Velden, 2013), but they have not examined how non-cognitive factors might relate to these skills. A possibility for exploring the role of these factors is available, however, in that the PIAAC Background Questionnaire assesses a non-cognitive construct, which PIAAC calls "readiness to learn".

The Background Questionnaire of the 2013 PIAAC Survey of Adult Skills contains a measure of readiness to learn (RtL) that is intended to assess adults' readiness to engage in learning activities in diverse settings (e.g., at home, at work). The RtL construct is operationally defined by the PIAAC using six indicators. These indicators address issues of cognitive scaffolding (i.e., how new material is integrated into existing knowledge), curiosity or enjoyment of learning new things, approaches to overcoming difficulty in one's learning, and problem solving or looking for connections among ideas. The designers of the Background Questionnaire note that the rationale for the inclusion of the readiness to learn items is "[t]here is good empirical evidence that learning strategies affect the acquisition of skills and educational attainment" (OECD, 2011, p. 53). It is important to note that readiness to learn does not appear to be synonymous with knowledge of learning strategies including what, when, and how to use such strategic skills to improve one's learning (i.e., metacognition).

The conceptual framework that guided PIAAC's development of the RtL scale is not altogether clear; however, it appears to be a composite variable derived from a variety of areas of the adult education and educational psychology literatures. These areas include cognitive processing, metacognition and learning strategies, students' study behaviors, self-regulation, and critical thinking -- several of which have been listed as "21st Century Skills" by Allen and van der Velden (2014), the chief architects of the PIAAC Background Questionnaire. In a report titled *Skills for the 21st century: Implications for education*, Allen and van der Velden (2012) make the point that while basic skills, specific skills, and *21st century skills* (Trilling & Fadel, 2009) are all essential to learning: "[t]here is a large gap in our knowledge in terms of most 21st century skills themselves, such as creativity, critical thinking, learning skills, socio-communicative skills and self-management skills" (Allen & van der Velden, 2012, p. 5). The document that details the conceptual framework of the Background Questionnaire (OECD, 2011) indicates that, while the questionnaire contains no direct indicators of innate learning abilities, "learning strategies may affect individuals' ability to learn" (p. 5), and also that "[a]lthough it is not practicable to describe the educational environments respondents have been exposed to, it does make sense to include indicators of respondents' learning strategies, which may in part be a result of such exposure" (p. 5). Referenced in the same discussion of learning strategies are concepts such as self-regulation, metacognitive abilities (that "structure the learning process and affect the efficiency with which new information is being processed" (OECD, 2009, p. 52), and information processing strategies.

Given the exploratory nature of our investigation into the relationship of adults' readiness to learn in their skills and skill uses within different social contexts, we posed the two research questions that follow. First, how does U.S. adults' readiness to learn predict their skill levels in literacy, numeracy, and problem solving in technology-rich environments (PS-TRE)? Second, how does readiness to learn predict the extent to which specified literacy skills (i.e., reading

writing, numeracy, and information and computer technology [ICT] skills) are used by U.S. adults at work and at home?

## Method

Data for this study came from the PIAAC Survey of Adult Skills (OECD, 2013a). The Survey of Adults Skills was administered to adults from ages 16 to 65 years in 24 countries as a part of the Program for the International Assessment of Adult Competencies (PIAAC) (OECD, 2013b). The Survey of Adult Skills assesses key skills that are used in the workplace, at home, and in the community, along with other related variables. The full Survey of Adult Skills consists of three elements: (a) a Direct Assessment that measures skill competencies in three domains—literacy, numeracy, and problem solving in technology-rich environments (e.g. locating information on the Internet); (b) a Module on Skills Use that assesses skill use both in the workplace and at home or in the community; and, (c) a Background Questionnaire that solicits information on a variety of personal background variables that could potentially influence skill development, maintenance, or use (e.g., education; work experience).

For the present study, responses from the U.S. sample only were examined because particular effects of interest may occur uniquely within the U.S. population and may, in fact, be disguised by aggregating the sample across countries (Hanushek et al., 2013). The data consisted of responses from $N = 5,010$ U.S. respondents between the ages of 16 and 65 years. The dependent variables of interest included (a) the three PIAAC-developed skill outcome measures (Literacy, Numeracy, and Problem-Solving in Technology-rich Environments [PS-TRE]), and (b) the PIAAC-derived indices of information processing skill use at home and at work (e.g., use of reading skills at home, use of numeracy skills at work). The primary predictor variable of interest was the composite Readiness to Learn (RtL) score, a derived variable created by the PIAAC survey developers and based on six indicators. Additional variables from the Background Questionnaire also were used as predictors, including age (coded in 5-year intervals), number of years of formal education, gender, and employment status (i.e., whether the respondent had worked for pay in the week prior to completing the survey).

## Findings

The results pertaining to our first research question, where literacy, numeracy, and PS-TRE scores were regressed onto the five predictors (RtL, age, education, gender, and work experience), showed that the combined set of predictors accounted for 34%, 38%, and 23% of the variability in literacy, numeracy, and PS-TRE, respectively. When the predictors were considered individually, each predictor significantly predicted literacy, numeracy, and PS-TRE scores (each $p < .05$) except for gender, which did not significantly predict literacy scores ($p = .56$). Specifically, increased RtL, increased years of education, and increased work experience were associated with higher levels of each of the skills outcomes (literacy, numeracy, and PS-TRE), while increased age was associated with lower scores on each of the three skills outcomes. Men scored significantly higher than women in numeracy and PS-TRE skills. The relative importance of the predictors was evaluated by computing the Pratt (1987) index for each. These indices indicated that RtL was a relatively weak predictor of each of the skills outcomes, while education was the strongest predictor. Interestingly, a follow-up analysis showed that RtL significantly ($p < .05$) moderated the relationship between education and both literacy and numeracy skills, with increased RtL lessening the deleterious effect of lower education on these outcomes. Finally, although age was a relatively weak predictor of literacy and numeracy skills,

it was the second-strongest predictor of PS-TRE skill, and this effect was in a negative direction. Specifically, older adults showed lower levels of PS-TRE skill than younger adults.

When results pertaining to our second research question were examined, RtL showed significant ($p < .001$) effects on each of the observed skill use outcomes. Moreover, examination of Pratt indices indicated that RtL had moderate-to-strong predictive power, as compared to the other predictors. In fact, for writing and reading skill uses at home, readiness to learn was the strongest of the five included predictors. The effect for the latter outcome, in particular, was very strong. Additionally, for five of the outcomes (information and communication technology skill use at home and at work, numeracy skill use at home and work, and reading skill use at work), RtL was the second strongest predictor.

### Discussion and Conclusion

Our investigation was designed to examine the association of U.S. adults' readiness to learn (RtL) with both (a) their literacy, numeracy, and problem solving in technology-rich environments (PS-TRE) skills and (b) their literacy, numeracy, and PS-TRE skill uses in different contexts (i.e., at home and at work).

Analyses of data on more than 5,000 U.S. participants in the 2013 PIAAC Survey of Adult Skills determined that readiness to learn significantly predicts literacy, numeracy, and PS-TRE skill levels--albeit rather weakly, as compared to educational attainment or age. While readiness to learn is a part of the overall picture of adults' literacy skills, schooling is much more important, as previous studies have convincingly shown (e.g., Reder, 1998). However, as confirmed by the moderating effect of RtL on the relationship between education and both literacy and numeracy skills, increased levels of RtL served to decrease the marked skill level differences between those with low versus high levels of education. This suggests that readiness to learn, as a non-cognitive construct, is particularly important for those at lower educational levels. If increased readiness to learn can buffer the deleterious effects of lower educational levels on skill level, then perhaps mechanisms that serve to increase readiness to learn might enhance the potential for career advancement of these individuals.

Our finding that readiness to learn was associated with adult skills supports the recent emphasis given to the effects of non-cognitive/affective attributes on learning (Duckworth & Seligman, 2006; Farrington et al., 2012; Nagaoka et al., 2013). These efforts suggest that educators and policy makers might do well to recognize and consider these non-cognitive factors; in the same way, employers might benefit from strategies or interventions aimed at increasing employees' readiness to learn, thus enhancing skill use and skill levels in the workplace. Similarly, our finding that increased age was associated with lower scores on each of the three skills outcomes, and in particular that age was the second-strongest predictor of PS-TRE skill--an effect manifest in a negative direction--suggests that educators and employers may want to devote attention to promoting readiness to learn among older learners, particularly for skills related to problem solving in technology-rich environments. Volkom, Stapley, and Amatuo (2014) make a similar recommendation for employers who wish to attract or retain older workers, based both on their own study findings and a review of the literature pointing to less comfort with the use of various forms of technology among older adults, as compared to younger age groups. For the most part their findings are not in alignment with ours regarding gender differences in technology use, although they found women exhibited less comfort and greater frustration with technology use than men. With regard to age-related differences in literacy and numeracy skills observed in the current study, older adults also are likely to have had lower

levels of formal education, with educational attainment being the strongest predictor for all skill levels measured.

In contrast to its effects on skill levels, readiness to learn appears to be more meaningful to the extent to which adults *use* information processing skills. In fact, for a number of such skill uses, the effects of readiness to learn were equal to or exceeded the effects of education. Readiness to learn is a particularly strong predictor of the use of various skills at home.

Thus, our findings suggest that readiness to learn is more related to skill use at home than at work. This may be due to the types of conditions and demands that employees encounter in the workplace, possibly including limited opportunities to apply certain skills at work relative to the potentially greater latitude in use of skills at home. That is, the use of workplace skills may be more constrained than home skill use, due to the particular roles and responsibilities aligned with specific occupations and, thus, workers must use these skills regardless of their own levels of curiosity, interest, or ability to relate ideas or concepts to each other or their own lives (i.e., their readiness to learn).

Our findings also suggest that, if readiness to learn predicts skill use better at home than in the workplace, the workplace may not be maximally utilizing the human capital that is present. If adults are using skills at home that relate to their learning readiness, then they clearly have these skills. But, perhaps these skills are not recognized as valuable, useful, or transferable to the workplace. It is likely that many workers (and their skills) are being underutilized in the workplace. While these data do not show that this is the case, the fact that readiness to learn emerges as a key factor in skill use merits further investigation. An important point to consider in these findings is that, although Readiness to Learn emerged as a key predictor of adults' skill use among the predictors considered, the set of predictor variables taken together still account for less than one-quarter of the variability in skill use (as reflected by the $R^2$ values). The predictors account for somewhat more variability in skill levels, but there are clearly other unexplored variables that may be affecting both skill level and skill use.

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