An Examination of Literacy and Computer Literacy Skills Amongst Adults Who Are Incarcerated: An Analysis of the PIAAC

Julia Yi, M.S., CCC-SLP
Division of Speech & Hearing Sciences, University of North Carolina - Chapel Hill

Background and Rationale

Print literacy and computer literacy are foundational skills necessary for health, education, and employment opportunities in our current world (Chiu, 2017; Organization for Economic Co-Operation and Development, 2012; Ruché & Poncze, 2011). A significant number of educational skills of adults who are incarcerated are significantly lower than the literacy skills of adults in the general population (Krenzke, Shippen, & Leskinen, 2000; Shippen et al., 2010). Additionally, access to technology is very limited and varies in correctional facilities (Contardo, 2016; Moraff, 2016).

The Program for the International Assessment of Adult Competencies (PIAAC) US database has been touted to be the “most comprehensive international survey of adults’ skills” (OECD, 2012, p. 1-1). The PIAAC provides information on print and computer literacy, as well as computer experiences among the prison and general household samples. The current investigation used the PIAAC to explore relationships among print and computer literacy and computer experience within and between these two samples.

Research Questions

1. Can literacy performance be predicted by computer experience? How much of literacy performance can be explained by computer experience?
2. Are there differences in computer experiences between the household and prison samples?
3. Are there differences in literacy performance based on computer experience between the household and prison samples?
4. Is there a trend in computer experience across age bands? How do these trends differ between the household and prison samples?

Methodology

The PIAAC study is composed of two main components: (a) the Cognitive Assessment, which assessed literacy, numeracy, and problem-solving in technology-rich environments; and (b) the ICT Use Questionnaire. There were two nationally representative samples in the United States: (a) the household sample that included 8,600 adults between 16-74 years old who participated in 2012 and 2014; and (b) the prison sample that included 1,546 incarcerated males who participated in 2012.

In order to determine basic computer experience, the PIAAC required the following: (1) prior computer use, (2) willingness to take the assessment on the computer, and (3) successful completion of four of six simple tasks on a basic computer, such as using the mouse and highlighting text on the screen (Mamedova, Shippen, & Ponczek, 2016). In the current investigation, these criteria was noted in the variable, PIROUTE. For the purposes of this investigation, a dummy variable was created using the PIROUTE variable, dividing participants into a group with and without computer experience.

The statistical analyses were conducted in the International Association for the Evaluation of Educational Achievement’s International Database Analyzer (IDB) and the National Center for Education Statistics’ International Data Explorer whenever possible, since both take into account PIAAC’s sampling and assessment design (e.g., the use of ten plausible values for the Literacy scores). In addition, IBM SPSS Version 26 was used when the aforementioned programs’ capabilities were not sufficient for the type of analysis being conducted.

Statistical Methods

For research question one, a linear regression analysis was conducted using the dummy variable for computer experience which was then inputted into the IDB analyzer. The dummy variable was the independent variable and the literacy scores were the dependent variable. For research question two, to determine if there were differences in the distribution of computer experiences between the general and prison samples, a chi-square test of homogeneity was first conducted. Afterwards, post-hoc analyses of pairwise comparisons using multiple t-tests of two proportions with a Bonferroni correction were conducted. For research question three, the mean scores of literacy for the two samples was aggregated and statistical significance was calculated. For the last research question, the chi-square, and cross tabulations of computer experience across 10-year age bands, and prison vs. household samples. The information from the crosstabs was then converted to a graph.

Results

RQ1. Can literacy performance be predicted by computer experience? How much of literacy performance can be explained by computer experience?

Yes, literacy scores can be predicted by computer experience. The R² for the household sample was .18 (.SE = .01), for the prison sample, .02 (.SE = .01), and for the total average, 10 (.SE = .01). In other words, 18% of the literacy scale score could be predicted by computer experience in the household sample, 2% in the prison sample, and 10% on average across both samples.

RQ2. Are there differences in computer experiences between the household and prison samples?

To determine whether the differences in the distribution of computer experiences were significant between the household and prison samples, a chi-square test of homogeneity was conducted. The two multinomial probability distributions were not equal in the population, χ²(15) = 247.384, p < .001. Post hoc analyses of pairwise comparisons using multiple t-tests of two proportions with a Bonferroni correction were conducted. There were differences between the household and prison samples were statistically significant at p < .01 except for those who held the ICT Core Stage 1. As suggested by the cross tabulations (Table 1) there were differences in the computer experiences of respondents in the U.S. general and prison populations.

Table 1 Cross tabulation of computer experiences in household vs. prison sample

<table>
<thead>
<tr>
<th></th>
<th>U.S. general household sample</th>
<th>U.S. prison sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>No computer experience*</td>
<td>449</td>
<td>137</td>
</tr>
<tr>
<td>Failed ICT Core stage 1</td>
<td>52%</td>
<td>15%</td>
</tr>
<tr>
<td>Assessed basic computer skills*</td>
<td>5.2%</td>
<td>4.3%</td>
</tr>
<tr>
<td>Refused the computer based assessment*</td>
<td>391</td>
<td>57</td>
</tr>
<tr>
<td>Took the computer based assessment*</td>
<td>41%</td>
<td>55%</td>
</tr>
<tr>
<td>Omitted*</td>
<td>201</td>
<td></td>
</tr>
<tr>
<td>Statistically significant at p &lt; .05</td>
<td>2.3%</td>
<td>11%</td>
</tr>
</tbody>
</table>

RQ3. Are there differences in literacy performance based on computer experience between the household and prison samples?

As seen in Figure 1, for those with no computer experience, the literacy scale score was 220.50 (SE = .21, SD = 51.53) and for the prison sample, M = 242.13 (SE = .35, SD = 5.50). For those with computer experience, the literacy score mean for the household sample was 282.36 (SE = 1.01; SD = 44.74) and for the prison sample, M = 254.11 (SE = .137; SD = 42.49). The differences for both were statistically significant at p < .01.

RQ4. Is there a trend in computer experience across age bands? How do these trends differ between the household and prison samples?

There is almost a direct trend that as age increases, the percentage of those with computer experience decreases across both samples. As it pertains to comparing the trends of the household to the prison samples, there are two main trends observed. The first trend is that the decrease in computer experience with age increase is more prominent in the prison sample compared to the household sample. A second trend is that there are consistently lower rates of computer experience across all age bands in the prison sample compared to the household sample. This difference between the prison and household samples generally continues to increase.

Discussion

First, computer experience was found to predict literacy performance. This corroborates the findings in the dataset that 11th grade students’ prior computer use predicted writing performance on a computer-based task, the PIAAC. To determine whether the differences in the distribution of computer experiences were significant between the household and prison samples, there are two main trends observed. The first trend is that the decrease in computer experience across age bands. This might be attributable to the fact that older inmates who have been incarcerated for an extended time, may have been incarcerated prior to the advent of the common use of computers and internet.

Adults who are incarcerated with low literacy proficiency and no to minimal computer skills are doubly disadvantaged since both skills are related to positive life outcomes (OECD, 2015; Chiu, 2017; Ruché & Poncze, 2011). On these findings, the assessment and implementation of evidence-based literacy interventions and explicit computer skills instruction increase in correctional facilities.

References


The author abandoned in ETO and US Citizenship of the PIAAC database in August 2019 and has received technical support from PIAAC’s research team. 

Disclosure

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