

Using Log Files to Identify Sequential Patterns in PIAAC Problem Solving Environments by U.S. Adults' Employment Status

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Introduction:

This research project aims at identifying malleable factors associated with problem solving skills that can be of use in improving these competences in U.S. adult education. Process data in log files were analyzed to identify key factors associated with digital literacy. Additionally, we compare patterns in problem solving derived from a closer examination of the different strategies used by groups that vary in employment-related characteristics (e.g., job category, learning at work, salary).

Research Questions:

- Which employment-related characteristics are significant related to the success of PSTRE items, and how do features extracted from process data differ by these employment statuses?
- Clustering test takers based on features extracted from process data, what do test takers in each cluster have in common regarding employment-related characteristics?
- What are the employment-related characteristics of test takers that are consistent, versus those who are inconsistent, regarding their features extracted from process data?

Findings:

- Young and well-educated test takers with more work experience and higher work-related skills have higher chances to succeed in solving digital tasks.
- The higher-performing group is more likely to use actions demonstrating clear sub-goals, whereas the lower-performing group shows more frequent use of aimless actions.
- Test takers are found to be in three clusters with differential levels of test taking effort (e.g., response time and number of actions). Test takers in the lowest effort group perform substantially lower than their peers, while those in the highest and moderate effort groups do not show remarkable differences in their proficiency levels.
- Test takers in the highest effort group demonstrate the highest proficiency level, but not necessarily possess the highest income, work-related skill use, or education level.
- Elder test takers who have non-skilled occupations with lower income, work-related skill use and education, exhibit consistent patterns in low effort and lower proficiency levels in problem solving items.

Practical Implications:

This project provides insights about the strategies that differentiate high and low PSTRE proficiency, and how it relates to adults' employment status. This would be of importance for policymakers to find better solutions to support adults' training for enhancing their problem-solving skills. When features from process data cannot be easily extracted, number of actions and response time could also be informative regarding the extent to which interventions are needed, especially when test takers are not able to provide correct answers. Special attention needs to be paid to groups with consistent low effort on PSTRE items.