Individual Paper Session II

Wednesday, April 5th, 2017, 16:30 – 17:30

Paper Session: Digital skills and inequality

Chair
Frank Goldhammer (German Institute of International Educational Research (DIPF); Centre for International Student Assessment (ZIB))

Room: Joseph Haydn

Presentations

- Title: Problem solving in technology rich environments. Effects of the life situation on the digital literacy in Austria and Germany.
  Authors: Bernhard Ertl & Christian Tarnai (Universität der Bundeswehr München, Germany)
- Title: Examining digital problem solving skills in libraries to promote digital equity
  Authors: Gloria Jacobs & Jill Castek (University of Arizona, USA)
- Title: Data Linking to Assess the Role of Numeracy Skills in Occupational Gender Segregation: Evidence from PIAAC
  Author: Katie Seely-Gant & Lisa M. Frehill (Energetics Technology Center, USA)

Title: Problem solving in technology rich environments. Effects of the life situation on the digital literacy in Austria and Germany.

Authors
Bernhard Ertl & Christian Tarnai (Universität der Bundeswehr München, Germany)

Abstract
The PIAAC study developed and conducts the Survey of Adult Skills. The survey measures adults' proficiency in key information-processing skills - literacy, numeracy and problem solving in technology-rich environments (PS) - and gathers information and data on how adults use their skills at home, at work and in the wider community (OECD, 2013). PS describes the competency of an individual to apply different technological tools in complex situations that may also require communication skills and meta-cognitive activities. These skills belong to the key qualifications of the 21st century, often labelled as digital literacy, and the term digital divide postulates a big discrepancy of technologically skilled and not/less skilled persons with respect to their chances for participation in society. However, research has shown that these skills are subject to several influences that relate to age, sex, education, migration status etc. Therefore, intersectional effects may appear when different of these influences coincidence.

The presentation compares effects of different influence factors on digital literacy in the context of the Austrian and the German sample of the PIAAC study. A first research question will analyse in which extent the German and the Austrian PIAAC sample of employed persons with computer use at home and at work differ with respect to their digital literacy. Then we will analyse the impact of the different factors on the digital literacy of both samples.

The analyses show that both samples differ with respect to their digital literacy outcomes and the impact of the influencing factors. Analyses could explain 32 per cent of the variance of
digital literacy in the German sample while 24 per cent of Austrian one. The main factors influencing digital literacy are – to different extent – age and education. In the German sample they are followed by migration background, status, and computer use at home while for the Austrian sample this was computer use at work and at home, status, and migration background. The influence of gender was quite low but comparably higher in the Austrian sample. The presentation concludes with a discussion of possible causes for these differences and their implications.

**Title:** Examining digital problem solving skills in libraries to promote digital equity

**Authors**
Gloria Jacobs & Jill Castek *(University of Arizona, USA)*

**Abstract**
University researchers and public librarians in the USA are collaborating on PIAAC research designed to improve library practices, programs, and services for adult library users—especially economically vulnerable and socially isolated adults, seniors, English learners, and others lacking basic digital literacy skills. Data were collected using Education and Skills Online (ESO) -- a PIAAC innovation that enables researchers to assess PIAAC skills in specific populations and settings and to compare these scores with other measures of performance in given contexts. In this study, researchers assessed the PSTRE skills of adult library users in relation to their performance on problem-solving tasks encountered in the technology-rich environment of libraries. This research has yielded a data-grounded learning progression that describes all levels of digital problem solving using observable strategies. The resulting taxonomy can be used to design effective learning sequences aligned to learners' needs. Two hundred library users completed the PSTRE and a background questionnaire that included demographics, Internet use metrics, and perspectives about the library's digital resources. Seventeen verbal protocols were audio recorded and screen-captured as participants completed the PSTRE and accomplished digital problem solving tasks using the library's website. The library tasks were designed using the PSTRE framework that considers the intrinsic complexity of the problem and task directions. Inferential statistics were run to examine the scoring patterns of different demographic groups who participated. Coding of the verbal protocols was mapped onto the cognitive dimensions of goal setting and monitoring progress; planning; accessing and evaluating information; and selecting, analyzing and transforming information as well as additional documented problem solving skills that emerged through inductive analysis. Preliminary analyses have revealed a set of observable strategies that seek to explain questions such as, what does the planning phase of digital problem solving look like? How do individuals self-monitor? Verbal protocol observations provide a grounded view of what digital problem solving processes actually look like within the PSTRE items and other problem solving tasks across proficiency levels from low- to highly-skilled. Results have important implications for deepening the field's understanding of both the PSTRE framework, digital literacy, and problem solving skills for libraries and their users.

**Title:** Data Linking to Assess the Role of Numeracy Skills in Occupational Gender Segregation: Evidence from PIAAC

**Authors**
Katie Seely-Gant & Lisa M. Frehill *(Energetics Technology Center, USA)*

**Abstract**
Numeracy skills are increasingly crucial for quality, long-term employment in the 21st century workplace. The emphasis on science, technology, engineering, and mathematics (STEM) careers to support national competitiveness further motivate research to understand the role of numeracy skills in recruitment and retention, particularly for women who are underrepresented in some STEM career fields, exacerbating the gender wage gap (Hegewisch & Hartmann, 2014). Previous analyses with Program for International Assessment of Adult Competencies (PIAAC) data provide insights about the relationship between gender, numeracy, and wages. Hanushek et al. (2015) found that a one standard deviation increase in numeracy skills corresponded to a 28% increase in U.S. workers’ wages, with a 15% gender wage gap when conditioning wages on numeracy. Lindemann’s (2014) PIAAC analysis of skill use found, despite common stereotypes, men and women have little significant variation in their use of numeracy skills in the workplace, with the key difference occurring in occupational classification; men are more likely to be employed in more traditional “STEM careers” where the use of numeracy skills is obvious. This paper also engages with comparable worth theory, wherein occupations dominated by women were seen as less demanding, despite the actual skillsets needed to perform the work (England 1992). We investigate this concept by examining the correlation between skill use and compensation for jobs that are predominately female and predominately male.

Representing part of a larger project, this paper explores the relationship between numeracy skills and occupational gender segregation by creating and analyzing a new dataset, constituted from the U.S. PIAAC and data from the U.S. Bureau of Labor Statistics (BLS) occupational-level data, including data elements from the O*NET database. These merged enable us to answer the following research questions:

- To what extent are numeracy skills associated with occupational gender segregation?
- To what extent are there correlations between assessed numeracy skills (PIAAC), numeracy requirements (O*NET), and occupational gender segregation?

The paper will also explore the potential of merging additional national and international occupational and labor datasets with PIAAC to support similar research for the OECD countries as well as for benchmarking.