Invited Symposium:
PIAAC Cycle 2: Between Trend and Innovation

Chair
Anouk Zabal (GESIS – Leibniz-Institute for the Social Sciences, Germany)

Abstract
PIAAC collects internationally comparable data on key foundation skills as well as a wide range of background information, and it offers rich opportunities for both academic and policy-relevant research. The second cycle of PIAAC continues a tradition of international adult literacy surveys and pursues the dual aims of monitoring change over time as well as introducing necessary adjustments and innovations to reflect societal and technological change. This symposium addresses the challenge of striking the right balance between consistency and change. The first contribution looks at how the theoretical frameworks for literacy and numeracy have been updated and enhanced for the second cycle of PIAAC, and how the cognitive instruments reflect the enriched constructs while maintaining the link to the first cycle. It will consider the reading components and the newly developed numeracy components, both designed to obtain more differentiated information at the lower end of the proficiency scale. Adaptive problem solving (APS) is a key skill in a rapidly changing world, and the assessment of this cognitive domain is an important innovation. The second contribution explores similarities and differences between the domain problem solving in technology-rich environments assessed in the first cycle of PIAAC and APS. It elaborates on the theoretical underpinnings of APS and discusses the challenges of operationalizing this construct for a large-scale assessment. The information collected through the background questionnaire lends PIAAC its analytical power. The third contribution discusses how constructs and measurements from the cycle one background questionnaire have been adapted or transformed to account for societal change while considering the need to maintain trend measurement. It also reviews new constructs that have been included to broaden the scope and strengthen the analytical possibilities. A valid, reliable, and comparable measurement of educational attainment is key for PIAAC. At the same time, the measurement of formal education is one of the most challenging in the context of achieving comparability across cultures and time. The approach followed in the second cycle of PIAAC to tackle these complex issues is presented and reflected upon in the fourth contribution.

Presentations
- Title: Measuring Literacy and Numeracy Skills in Adults – Trends and Innovations.
  Author: Laura Halderman (Educational Testing Service/ETS, USA)
- Title: From Problem Solving in Technology-Rich Environments to Adaptive Problem Solving – Concept and Measurement.
  Authors: Samuel Greiff & Juliana Gottschling (University of Luxembourg, Luxembourg)
- Title: The Background Questionnaire: Maintaining Trend, Accounting for Societal Change, and Adding Innovative Elements.
  Author: Tim Huijts (ROA, Maastricht University, The Netherlands)
- Title: Formal Education in PIAAC Cycle 2: Challenges and Opportunities.
  Author: Silke Schneider (GESIS – Leibniz-Institute for the Social Sciences, Germany)
Measuring Literacy and Numeracy Skills in Adults – Trends and Innovations.

Author
Laura Halderman (Educational Testing Service/ETS, USA)

Abstract
The second cycle of PIAAC carries forward the domains of Literacy and Numeracy because of the foundational role these domains have played in the assessment of adults’ skills. The domains of Literacy and Numeracy maintain a strong link to the first cycle (and previous surveys) by including a subset of the Cycle 1 items. Maintaining this link is essential for measuring trends in adults’ skills ten years after the first cycle. However, society has seen changes within the last ten years that warrant changes to these core domains, changes that must be balanced with the ties to the past. To that end, a group of experts in the domains of Literacy and Numeracy were selected to update the framework for each domain. Through this work, the experts identified the kinds of cognitive processes that should be represented in the new items to reflect the modern challenges adults face when engaging with Literacy and Numeracy activities in their personal, social and professional lives. The result is an item pool that contains a set of items from the first cycle of PIAAC and a set of new items that reflects the cognitive processes of the trend items and extends the item pool to represent the processes that have become more prevalent in adults' lives. In this presentation, I’ll provide examples of how the Literacy and Numeracy item pools have been designed to achieve this balance. In addition, I will present the Reading and Numeracy component measures. In Cycle 1, Reading Components were administered via the paper-based assessment to capture the component reading skills of individuals with lower ICT skills. In cycle 2, Reading Components will be administered on the tablet, creating a more uniform administration with finer-grained timing information and across a wider range of skill. New measures of Numeracy Components have been designed to capture information about adults' skills at the lower end of the distribution. Collectively, these new and trend measures seek to extend what researchers know about adults' Literacy and Numeracy skills and their understanding of trends over time.


Authors
Samuel Greiff & Juliana Gottschling (University of Luxembourg, Luxemburg)

Abstract
In today's world it has become increasingly important to deal with dynamic and changing problem situations. We are confronted with a wealth of information from a variety of sources – be it physical, social, or digital – and the need for skills that enable adults to adapt their thinking and reasoning to new and changing information has increased significantly. In order to address these new challenges, the first PIAAC cycle already included the assessment of problem-solving abilities in technology-rich environments (PS-TRE), focusing on the proficiency in the use of specific digital applications to access, search, manage, interpret, and evaluate information. The assessment of problem-solving in the second cycle of PIAAC goes beyond this and focuses on adaptive problem-solving (APS), i.e., the ability to adapt to dynamic changes in problem situations. More specifically, the assessment of APS focuses on dynamic problems that require constant monitoring and, if necessary, adaption of the initial problem solution. Furthermore, the assessment of APS in the second cycle of PIAAC puts emphasis not only on cognitive, but also on metacognitive processes. In this presentation we
will introduce the underlying theoretical assumptions that guided the construction of the APS units by means of exemplary items. We will also discuss the challenges and potential pitfalls in the assessment of APS in large-scale assessments of problem-solving.

### The Background Questionnaire: Maintaining Trend, Accounting for Societal Change, and Adding Innovative Elements.

**Author**

Tim Huijts *(ROA, Maastricht University, The Netherlands)*

**Abstract**

The skill measurement in PIAAC is complemented by the Background Questionnaire (BQ). The main aim of the BQ is to provide information on possible outcomes and antecedents of key information-processing skills, as well as on demographic and structural indicators that are needed to describe the distribution of such skills within and between countries. To achieve this aim, the BQ needs to include reliable, valid, and equivalent measurements of constructs relevant for understanding the causes and consequences of key information-processing skills across countries. The BQ for PIAAC Cycle 1 was the obvious starting point for developing the BQ for Cycle 2. Most constructs that were covered in Cycle 1 continue to be relevant for the skills measured in PIAAC. Additionally, maintaining measurements in the same form or in a comparable form offers the opportunity to directly compare the results of both PIAAC cycles, and to examine trends. However, societies have changed since PIAAC Cycle 1, and these changes also need to be reflected in the BQ. Moreover, several innovative elements have been brought forward to further strengthen and enrich the BQ. In this contribution, I will discuss how we worked to achieve this balance between continuity and change in the development of the BQ for PIAAC Cycle 2. More specifically, I will reflect on the implications and challenges of trend measurements in the BQ. I will explain how for several constructs we have made small changes to measurements to reflect societal change, while still maintaining comparability between cycles. I will also give examples of constructs and measurements that needed to be changed to reflect recent societal and technological developments, such as the use of ICT skills at work and in everyday life. Finally, I will briefly cover the main areas of innovation in the BQ for PIAAC Cycle 2.

### Formal Education in PIAAC Cycle 2: Challenges and Opportunities.

**Author**

Silke Schneider *(GESIS - Leibniz-Institute for the Social Sciences, Germany)*

**Abstract**

Educational attainment is closely related to both cognitive skills as well as many 'outcomes' measured in the PIAAC background questionnaire (BQ) - be it employment, income, health or attitudes. It is also a mediator of parental resources and thus an important element in the intergenerational transmission of (dis-)advantage and thus social inequality. A high-quality measurement of formal education in PIAAC is thus of paramount importance. However, this is highly challenging, given the ongoing changes of educational systems, their inherent lack of comparability across countries, and the revision of the International Standard Classification of Education (ISCED - the main 'tool' for making education data comparable across countries) in between PIAAC Cycles 1 and 2. This presentation examines two challenges in this regard: 1) the challenge of cross-national comparability and 2) the challenge of comparability over
time, i.e. between PIAAC Cycle 1 and 2. The talk will present the ex-ante output harmonization and quality assurance procedures implemented for PIAAC Cycle 2 to counter both challenges. In addition, the measurement of formal education was further differentiated in PIAAC Cycle 2 compared to PIAAC Cycle 1, building on the three-digit coding scheme provided by ISCED 2011. This will allow to test more specific hypotheses regarding the effects of formal education, including vocational education and training (VET) across education levels, and more comprehensively to control for effects of (different kinds of) education. Finally, for PIAAC Cycle 2, an innovative instrument was developed to comparatively measure 'educational pathways', opening up new opportunities to study the effects of early transitions in tracked education systems, or the cumulation of different educational qualifications over the life course.