Critical areas for assessing skill transfer: Statistics education and PIAAC

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Levels/units of analysis when assessing stat knowledge & skills

<table>
<thead>
<tr>
<th>Individual learner</th>
<th>Key challenge:</th>
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<tbody>
<tr>
<td>Class / Course</td>
<td>How to assess?</td>
</tr>
<tr>
<td>Program / Curriculum</td>
<td>(content already</td>
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<td></td>
<td>determined by</td>
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<tr>
<td></td>
<td>curriculum/teacher)</td>
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<table>
<thead>
<tr>
<th>School / State / Nation</th>
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<tr>
<td>International TIMSS, PISA PIAAC</td>
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What to assess?
(the definition of target skills is itself a topic for discussion and consensus-building)
OECD surveys

**PISA: Program for International Student Assessment**

Age 15 students “…are prepared to meet the challenges of today’s knowledge societies… what they can do with what they learn at school…”

Literacy, Math, Science Cycle: 3 years.

**PIAAC: Program for International Assessment of Adult Competencies**

Prior non-OECD surveys: ALL (Adult Literacy and Lifeskills survey) IALS (International Adult Literacy Survey)

PIAAC methodology & Content
(tentative, as of summer 2007)

Adults ages 16 to 65+.
Household survey interview (CAPI + written)
Cycle: 5 years.

Competencies:
- **Document Literacy** (forms, graphs, tables, …)
- **Numeracy** Number, Dimension & shape, Patterns & relationships, Data & Chance
- Problem-solving in technology-rich env.??
- …
- **Background Questionnaire:** bio-data, economic & social outcomes, …
PIAAC ‘competency’: Interest, attitude, and ability of individuals to access, manage, integrate, and evaluate information, construct new knowledge, and communicate with others in order to function effectively in the information age.

Numeracy (tentative): The ability to access, use, apply, interpret, and communicate mathematical information and ideas, in order to effectively manage and respond to the mathematical demands of diverse situation in the information age.

Enabling processes: attitudes, beliefs, interests

Questions & Challenges

1. What are critical areas in which adults should possess statistical literacy (as part of Numeracy and Document Literacy competencies)?

2. What are good tasks for assessing key statistical literacy (data, probability) of adults:
   a. relevant & realistic across countries
   b. elicit open responses that can be scored reliably
   c. suitable for household interview (computer/ written)
   d. show good psychometric properties (validity, reliability, fairness)

Iddo Gal, Aug 2007
TIMSS 1996
Mathematical Literacy
Final year

A TV reporter showed this graph and said:

“There has been a huge increase in the number of robberies this year”

Do you consider the reporter’s statement to be a reasonable interpretation of the graph?

Briefly explain.
Relevance of large-scale assessments for class assessments

- show that it is possible to reliably assess levels of performance/understanding (partial credit rubrics)
- provide frameworks/theories of domains for assessment of relevance to society, policy makers, and educators
- illustrate “complexity schemes”, i.e., maps of factors that contribute to task difficulty (important for task development and interpretation)

Document Literacy
(Kirsch & Mosenthal, 1985 - 2004)

The knowledge and skills required to locate and use information contained in various document formats (applications, forms, schedules, maps, tables, graphs).

- simple lists
- combined lists
- intersecting lists
- nested lists

Cognitive processes: Locating / matching - cycling - integrating - generating – inferring
Challenges for the future

1. What are the critical areas in which adults should possess statistical literacy? (general, specific)
   - Can we identify central tasks adults face?

2. How can we prepare students for “skill transfer” to such tasks / areas?
   - How can we assess “skill transfer” in this regard? (performance + understanding, argumentation, …)

3. How can we evaluate, and improve, the reliability, validity, interpretability, and relevance of assessments, to: students, teachers, society?