Large Scale Assessment (LSA) and Technology-Based Assessment (TBA) activities at DIPF
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Frank Goldhammer, Heiko Rölke
LSA activities at DIPF (1)

• DIPF leads, coordinates and implements national and international LSA studies

• Studies aim at the investigation of the quality and outcome of educational processes at school and classroom level

• Major fields: Measuring and modeling competencies, technology-based assessment, school and classroom context
LSA activities at DIPF (2)

• Programme for International Student Assessment (PISA)
  ○ PISA 2009
  ○ PISA 2012
  ○ PISA 2015
• Programme for the International Assessment of Adult Competencies (PIAAC)
• National Educational Panel Study (NEPS)
• Center for International Large Scale Assessment (ZIB)
PISA 2009 – national level

• Implementation of the PISA study in Germany

• National extension of the PISA study for research purposes (e.g., to validate the Electronic Reading Assessment, ERA)
PISA 2009 – international level

• Membership of the international expert group for the Electronic Reading Assessment (ERA), i.e., contribution to framework and test development, data analysis and reporting (Vol. VI)

• Provision of technology for the development and delivery of ERA items (TBA group: Hypertext Builder, delivery system using CD ROMs)
PISA 2009 – ERA sample task

Task 1: You are at the Philosophers’ Café Home page. Click on the link for Confucius.

What did Confucius mean by “Ren”?

- Peace and prosperity.
- Living in chaos and war.
- The behaviour of rulers.
- Kindness to other people.
- Living in harmony.
PISA 2012 – national level

• National extension of the PISA study for research purposes (e.g., to validate CBA components)
PISA 2012 – international level

• Chair of the international PISA Questionnaire expert group and responsibility for the analytical framework

• Technological support of translation workflow; delivery system for CBA components (USB stick)
PISA 2015 – international level

• Successful bid for Core 6 module („Context Questionnaire and framework development“) covering the development of the context questionnaires for PISA 2015 and their conceptual framework
PIAAC – international level

- Programme for the International Assessment of Adult Competencies
- Initiated by OECD
- Target population: 16 – 65 years

- DIPF: Technology for item and test development, translation, delivery, technical support
NEPS

• National Educational Panel Study
• Funded by Federal Ministry of Education and Science (BMBF)
• Investigates educational processes in Germany, from early childhood to advanced age

• DIPF: Data Warehouse, Mode Effect Studies (CBA vs. PBA)
ZIB

- Center for International Large Scale Assessment (ZIB)

IPN - Institute for Science and Mathematics Education

IQB - Institute for quality development in education

DIPF

TUM – Technical University Munich, School of Education
ZIB

• Center for International Large Scale Assessment (ZIB)
• Goals
  o national implementation of PISA
  o research on international comparative studies in education

• DIPF: Research on educational assessment using technology
Some more LSA activities at DIPF

• Deutsch Englisch Schülerleistungen International (DESI) [German English Student Assessment International]

• Building a European Bank of Anchor Items for Foreign Language Skills (EBAFLS)

• Teaching and Learning International Survey (TALIS)
Large Scale Assessment (LSA) and Technology-Based Assessment (TBA) activities at DIPF

Heiko Rölke, Frank Goldhammer
TBA: Mission Statement

• Support national and international assessments
• Develop innovative assessment instruments and methods
• Perform assessment-related research, both in psychology and computer science
TBA: Background

Requirements (Research and Practice)

Psychometrics/Methods

Technology/Transfer

Technical Innovations

Computer Science

Basic research
Pre-school
School
Vocational Training
University
Qualification
LLL
Other Institutions

Psychometrics/Methods

Technology/Transfer

Technical Innovations

Computer Science
TBA: Group Structure

Main Idea:

Innovations and sustainable development requires work of equal partners

• Psychology
• Computer Science
TBA: Key Ideas

• Empower users,
  hide complexity
• Integrated workflow support
• Rapid prototyping of ideas: instruments, methods, …
• Re-use instead of re-invention
TBA: Technology Chain

- Data Management and Storage
- Item Development
- Item Adaptation
- Item Banking
- Test Management
- Test
- Data Capture
- Data Processing
Example: CBA ItemBuilder

• **Idea:**
  Enable domain experts to design/implement complex items

• **Concept:**
  - Graphical GUI design in a (near) WYSIWYG-manner
  - Authoring system, intelligent templates
  - Generation of item descriptions, run-time interpretation

• **Implementation:**
  - Based on open-source and freely available software
  - Model-driven architecture
CBA IB: Guiding Principles/Strategy

- Graphical Development
- Emphasis on Complex Items
- Modular development: Features
  - Restricted versions, e.g. Adaptation
- Modular development: Delivery
  - TAO
  - CBA-EE
  - TBA-Tools
  - …
From HypertextBuilder to CBA ItemBuilder

1. PISA 2009 - ERA
2. Intermediate Development:
   „Dynamis“
3. PIAAC
   - Interaction modes
   - Fine-grained graphics control, rich text fields
4. New Development:
   Finite Automata
Browser Simulation:
Portal of the German Rail (Deutsche Bahn)

Meine Suche:

Deutschland erleben

Freuen Sie sich auf den Frühling und lernen Sie Ihr Land kennen!
Bei uns finden Sie Ausflugstipps, Specials und regionale Angebote.

Ob eine Städtereise oder eine Fahrt in die Natur - bei uns ist alles dabei!

Für April und Mai gibt es noch freie Angebote in unserem Kontingent, z.B. für Ferien an der Ostsee oder im Schwarzwald (mehr Infos).
PISA 2009 – ERA: Language Support

PISA 2009 Electronic Reading Assessment

Website: http://www.pisa.org/practice/textbox.html

Textbox: Enter your name...

Options: Delete your text, Save your text, Edit your text.
PIAAC: New Features

• Rich text fields, advanced text layout
• Images, Multi-media player
• Dynamic Links
• Configurable Size
• Execution Environment
• New Response Modes
  • Clickable Areas (Text, Images)
  • Multiple Marking (highlight)
  • Click boxes, Buttons, Text entry, Tables,…
• Automatic Scoring
New: MicroDYN, MicroFIN

• For complex problem solving and advanced simulation items
• Finite Automata to
  1. Control Item behaviour
  2. Serve as a basis for Problem solving

1. Realistic behaviour for complex items
   • GUI simulation
   • Complex settings like science education

2. Basis for items, to be discovered by testee
Translation Features

ItemBuilder exports all text and text properties

- **XLIFF**
  - standard file format for translation
  - source language, target languages
  - supported by all major translation tools

- **OLT**
  - free (open source) translation tool
  - used for PISA and PIAAC
Translation: Example

[Image of a translation editor interface with English and German text]
Conclusions

• Challenges related to TBA
  o Technical requirements (Hardware, Software, Staff)
  o Test equivalence (cross mode)
  o Test fairness

• Benefits from TBA
  o Standardized delivery and scoring
  o More valid item formats (e.g., simulations)
  o Measurement efficiency (adaptive testing)
  o Economical data collection and analysis
TBA Offers and Services

TBA has experience and expertise in all areas of assessments

- Consultancy
- Tools and workflows
- Tailored solutions
- Assessment services