Convergences in Education?
The Changing Power of International Student Assessments and the Role of Information Infrastructures

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The Power of Assessments
Do international student achievement studies lead to convergences in education?

How and where do convergences occur, when they do?

In what way do national characteristics modify international influences?
Agenda for today

1. Educational Governance and Internationalization of Education
2. Previous research findings
3. Theoretical framework
4. Empirical examples
5. Conclusions
Changes in Educational Governance

- Changes in educational governance began long before PISA and Co.
- Internationalization and privatization raised need for assessments
- International Organizations and private actors developed own agendas
„By some estimates, half the countries that have taken Pisa tests since they started in 2000 have reformed their education systems in light of the results.” (The Guardian, November 26, 2013)

Breakspear (2012): PISA judged as “very influential” in 17 of 37 countries
Previous Research

- Numerous case studies and a few reviews
- Results are mixed: Very different policy reactions
- Cause not clear, PISA often used as pretext
- Relationship Policies ↔ Effects not clear
<table>
<thead>
<tr>
<th>Policy Framework</th>
<th>Germany pre-PISA (until 2001)</th>
<th>OECD (PISA)</th>
<th>Germany post-PISA (since 2001)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy Content</td>
<td>Knowledge Oriented Education</td>
<td>Competence Oriented Education</td>
<td>Competence Oriented Education</td>
</tr>
<tr>
<td></td>
<td>Early Selection and Tracking</td>
<td>Comprehensive Schooling</td>
<td>Eased Early Selection and Tracking</td>
</tr>
<tr>
<td></td>
<td>Educate Every Student According to Abilities</td>
<td>Support Disadvantaged Students</td>
<td>Efforts to Support Disadvantaged Students According to Needs</td>
</tr>
</tbody>
</table>

Sociological Institutionalism
(Stanford School)

Convergence Approaches
(e.g. Holzinger, Knill)

Institutional Differentiation
(Lepsius)

**Theoretical framework**

Why?

Convergence of standards, discourses, policies, outcomes, information infrastructures

How?

Why not? What?

*EXZELLENT.*
Basic assumptions:
- Social processes shape technologies (social determinism) as a reaction to technological determinism (e.g. Bijker, Collins, Pinch, Wajcman, Weingart etc.).
- Large-technical systems (Weingart 1989) like information infrastructures need to be regarded as socio-technical systems and have their own social genesis (Rammert 1993).

Information infrastructures are “institutions” as they “...constitute the background condition for action, enforcing constraints, giving direction and meaning, and setting the range of opportunities for undertaking action” (Ciborra & Hanseth 1998).
Intermediate perspective: Technology is socially shaped and participates itself as actor in (heterogeneous) networks (⇒ “actants”).
What are Information Infrastructures?

- Large-scale socio-technical systems, consisting of telecommunication investments, human resources and application development (Blanning et al. 1997).
- Similar to physical infrastructures of cities or states with canals, traffic and street intersections, as well as rules and norms and underlying assumptions about its use.
- Based on software, i.e. data structures and algorithms
- Some Examples ...

NII: Information superhighway

Ecosystems

NGfL

Google

National Grid for Learning (UK 1988ff)
“[A]ssemblage of people, technology and policy” (Anagnostopoulos 2013)

... based on software.
What is software?

- “something that is constituted by code, written in specific programming languages, and structured and operationalized through algorithms [...] that can be automatically read and translated by a machine in order to do something” (Williamson 2014)
- “the manifestation of a system of thought – an expression of how the world can be captured, represented, processed, and modelled computationally” (Kitchin & Dodge 2011)
- Software is a “vital source of social power” (Kitchin & Dodge 2011)
Empirical example 1: 
Teacher value-added database

Los Angeles Teacher Ratings

About 11,500 Los Angeles Unified elementary school teachers and 470 elementary schools are included in The Times' updated database of "value-added" ratings.

Most third-, fourth- and fifth-grade instructors who taught at any point during the 2004-05 through 2009-10 academic years were given ratings in the Times analysis. Most district elementary schools are included. Test scores for most charter schools were not available.

A teacher's value-added rating is based on his or her students' progress on the California Standards Tests for English and math. The difference between a student’s expected growth and actual performance is the "value" a teacher added or subtracted during the year. A school's value-added rating is based on the performance of all students tested there. Small differences in ratings are not statistically significant, particularly for those rated near the average.

Although value-added measures do not capture everything about a teacher or school’s performance, The Times decided to make the ratings available because they bear on the work of public employees who provide an important service, and in the belief that parents and the public have a right to the information.

Find a teacher... Search

Or, find a school Search

Amy P. Miller
A 5th grade teacher at Park Western Place Elementary in 2010

These graphs show a teacher's "value-added" rating based on his or her students' progress on the California Standards Tests in math and English. The Times' analysis used all valid student scores available for this teacher from the 2003-04 through 2009-10 academic years. The value-added scores reflect a teacher's effectiveness at raising standardized test scores and, as such, capture only one aspect of a teacher's work.
The black box (algorithm) behind the value-added model

Box I. A Value-Added Model for a Given Subject, Grade, and Year

\[ Y_{ti} = \zeta + \lambda Y_{0i} + \beta' X_i + \sum_{k} \sum_{j} \sum_{l} \{ \alpha_{jkl}^{\text{class}} I_{cijkl} + \alpha_{kl}^{\text{school}} I_{sijkl} + \alpha_{l}^{\text{district}} I_{dijkl} \} + \varepsilon_i \]

- Posttest
- Pretest
- True Total Classroom Effect
- True Total School Effect
- True Total District Effect
- Student Error Term

Student Characteristics

Classroom Participation Indicator

School Participation Indicator

District Participation Indicator

Empirical example 2: National Single Indicator (UK)

Welcome to schoolperformancetables - home of the National Single Indicator

This combines a number of standardised and well-documented measures of school performance to provide a simple, straightforward benchmark of how well a school is doing. Even better, you can modify this according to how important you think these measures are and create a 'personal indicator' tailored to your own specification. As if that wasn't ground-breaking enough, we also offer the means to select your secondary school by the subjects that you want your child to study (beyond the core curriculum, of course). By itself, our National Single Indicator gives a good illustration of a school's attainment, its progress and its ability to stretch out beyond its environment. Together with a number of other factors that we publish it provides a brand new way to compare schools and inform choices.

Learn more about these measures and how our NSI is calculated in our detailed documentation.
Empirical example 2: National Single Indicator (UK)

<table>
<thead>
<tr>
<th>Name</th>
<th>National Single Indicator</th>
<th>My Indicator</th>
<th>% 5+ A*-C including English &amp; Maths</th>
<th>Average Point Score</th>
<th>Value Added</th>
<th>% making expected progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Lancaster High School</td>
<td>B ★★★★★★</td>
<td>B ★★★★★★</td>
<td>60%</td>
<td>358.0</td>
<td>1012.3</td>
<td>73% 84%</td>
</tr>
<tr>
<td>Lancaster Girls’ Grammar School</td>
<td>A ★★★★★★</td>
<td>A ★★★★★★</td>
<td>100%</td>
<td>435.3</td>
<td>1028.2</td>
<td>100% 97%</td>
</tr>
<tr>
<td>Lancaster Royal Grammar School</td>
<td>A ★★★★★★</td>
<td>A ★★★★★★</td>
<td>98%</td>
<td>420.8</td>
<td>1015.6</td>
<td>94% 99%</td>
</tr>
<tr>
<td>Lancaster School</td>
<td>SPECIAL</td>
<td>SPECIAL</td>
<td>0%</td>
<td>7.5</td>
<td>SUPP</td>
<td>0% 0%</td>
</tr>
<tr>
<td>Lancaster Steiner School</td>
<td>INDEPENDENT</td>
<td>INDEPENDENT</td>
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<tr>
<td>The Lancaster School</td>
<td>C ★★★★★★</td>
<td>C ★★★★★★</td>
<td>59%</td>
<td>323.4</td>
<td>978.6</td>
<td>69% 68%</td>
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</table>
Empirical example 3: School ratings in social media (Germany)

<table>
<thead>
<tr>
<th>Die Schule in Noten</th>
<th>3,2</th>
<th>4,1</th>
<th>3,6</th>
<th>2,6</th>
<th>3,1</th>
<th>3,8</th>
<th>2,9</th>
<th>3,1</th>
<th>3,5</th>
<th>4,0</th>
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<td>technische Ausstattung</td>
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<td>Stimmung unter Mitschülern</td>
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<td>Fächer/AG-Angebot</td>
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<td>Sportmöglichkeiten</td>
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<td>Unterrichtsaufläufe</td>
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<td>Essensmöglichkeiten</td>
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<td>Mitbestimmungsmöglichkeiten</td>
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Gesamtnote: 3,4
Information infrastructures: “actants” in processes of convergence

Technological standardization: Similar systems (by the same multi-national companies) across the globe, economies of scale

Convergences of policy: state agencies require information infrastructures for accountability, they make or buy similar systems
Theoretical framework

Convergence of standards, discourses, policies, outcomes, information infrastructures

Why?
- **Sociological Institutionalism**
  (Stanford School)

How?
- **Convergence Approaches**
  (e.g. Holzinger, Knill)

Why not? What?
- **Institutional Differentiation**
  (Lepsius)

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Empirical Findings II: Analyzing Policy convergence with PISA Data

- **Strength**: Three-Annual, large scale
- **Weakness**: limited comparability!
- 154 items at school level comparable
- Accountability, Autonomy, Ability Grouping, Funding, Admission...
### 2003

**Q26** In your school, who has the main responsibility for:

*(Please tick as many boxes as appropriate in each row.)*

<table>
<thead>
<tr>
<th></th>
<th>Not a main responsibility of the school</th>
<th>School’s governing board</th>
<th>Principal</th>
<th>&lt;Department Head&gt;</th>
<th>Teacher(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) selecting teachers for hire</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

### 2006

**Q11** Regarding your school, who has a considerable responsibility for the following tasks?

*(Please tick as many boxes as appropriate in each row)*

<table>
<thead>
<tr>
<th></th>
<th>Principal or teachers</th>
<th>&lt;School governing board&gt;</th>
<th>&lt;Regional or local education authority&gt;</th>
<th>National education authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Selecting teachers for hire</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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</tbody>
</table>

### 2009

**Q24** Regarding your school, who has a considerable responsibility for the following tasks?

*(Please tick as many boxes as appropriate in each row)*

<table>
<thead>
<tr>
<th></th>
<th>Principals</th>
<th>Teachers</th>
<th>&lt;School governing board&gt;</th>
<th>&lt;Regional or local education authority&gt;</th>
<th>National education authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Selecting teachers for hire</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
Change of Proportion of Students attending schools using benchmark assessments 2000 - 2012

Proportion of students attending schools using benchmark assessments 2012
Change of Privatization 2000 - 2012
Share of students at private schools 2012
Conclusion and Outlook

- Analysis of convergence requires analyses of **different levels and features** of education systems:
  - Policies, Standards, Discourses, Infrastructures & Outcomes
- ...requires **theoretical foundation** in order to understand complex processes of convergence and non-convergence
- Assessments are not “the cause”, they are symptoms (Audit Society!)
  → but their design is not arbitrary and shapes their effects!

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