



Valid Assessment of Key Learning Outcomes in Higher Education
—
Results and International Perspectives of the German Research Program
“Modeling and Measuring Academic Competencies”
KoKoHs I & II

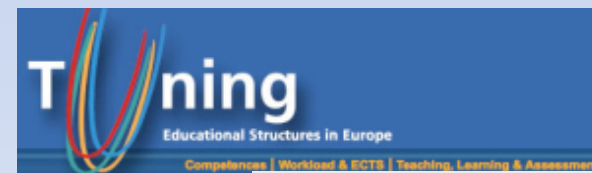
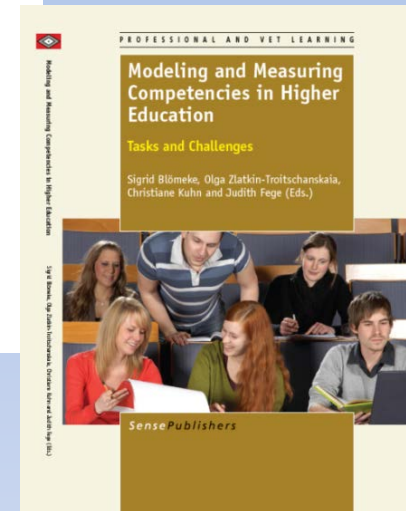
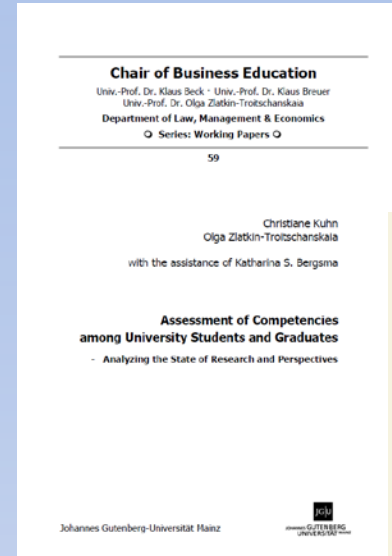
Prof. Dr. Olga Troitschanskaia

Conference "21st century key competencies: new value for literacy in a modern society"
October 16, 2015

1. Competency Orientation in Higher Education
2. Purpose and Aims, Structure and Projects in KoKoHs I
3. International Perspective and Cooperation
4. KoKoHs I – Results
5. KoKoHs II – Challenges and Perspectives in Competency Measurement

Initial situation

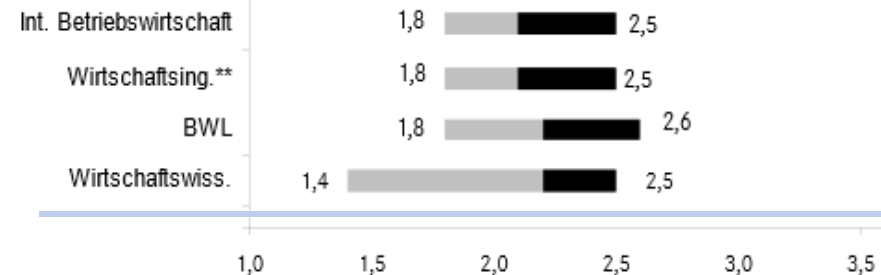
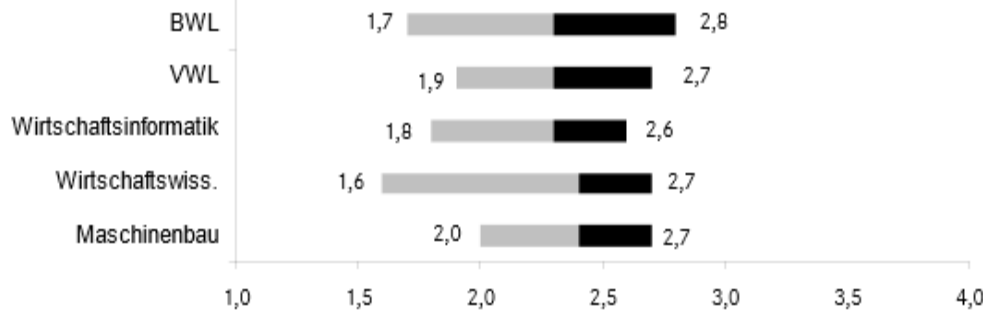
- Discussions and early approaches to competency orientation in higher education, also following Bologna reform
- National and international frameworks to define learning outcomes (e.g., EQF)
- Competencies formally defined in module descriptions, study and examination regulations



1. Competency Orientation in Higher Education

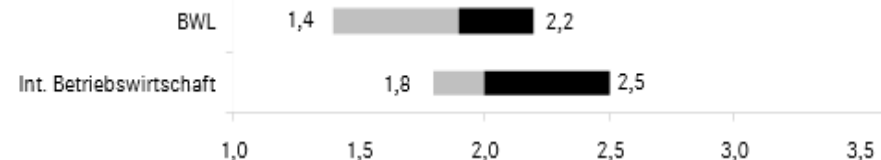
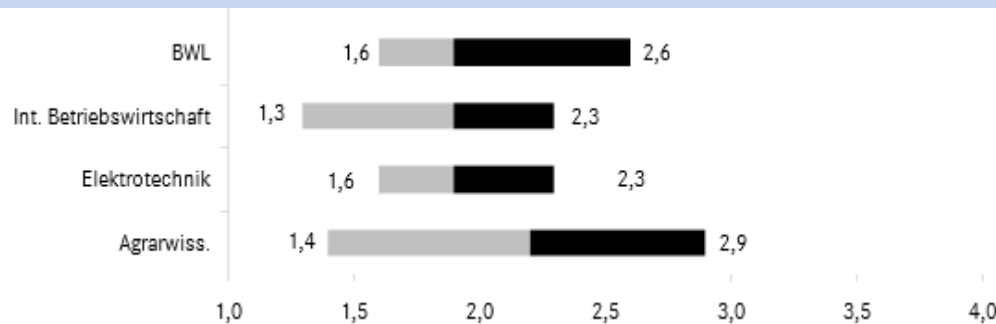
Grade Point Average (GPA)

Bachelor



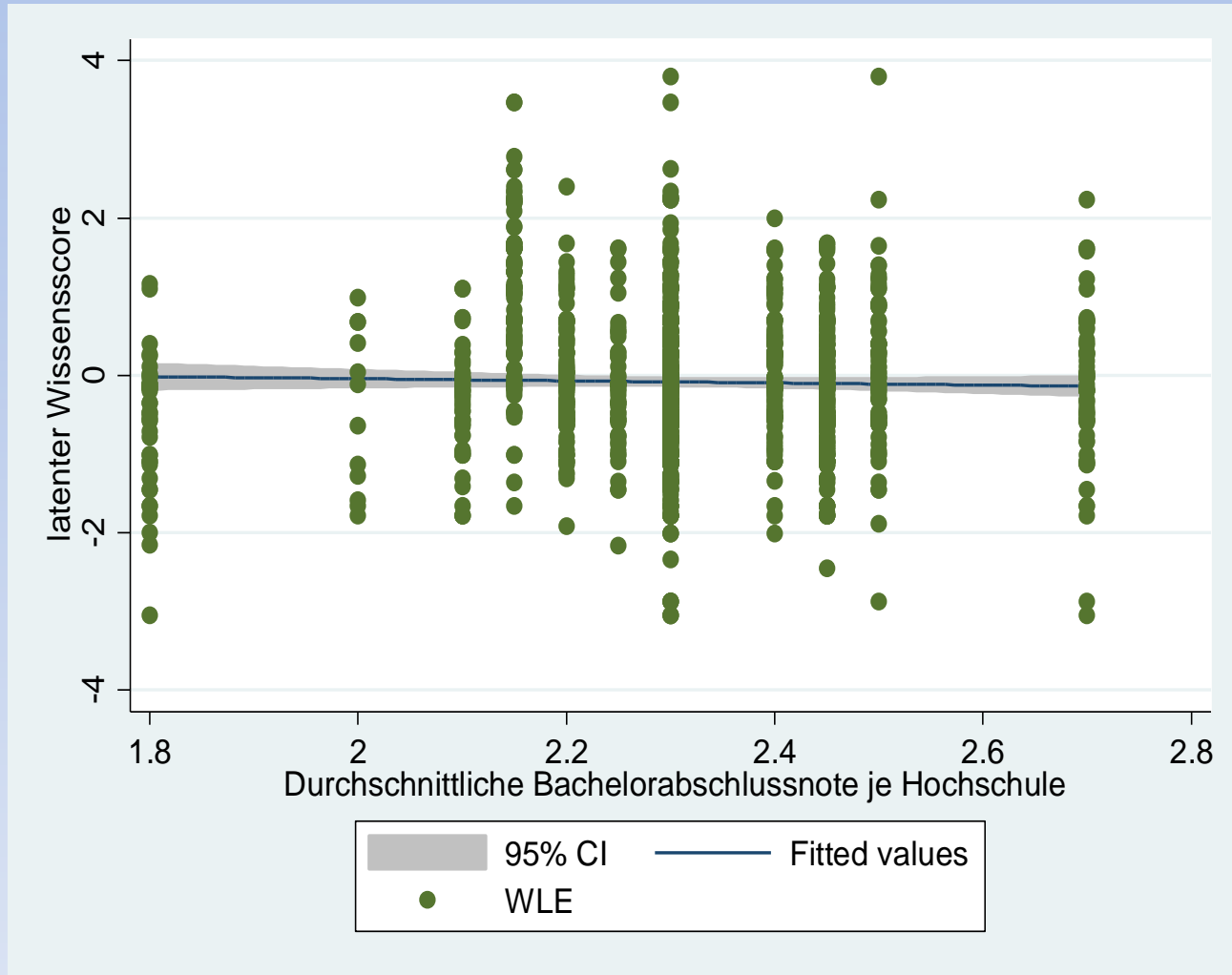
* mit wirtschaftswissenschaftlichem Schwerpunkt. - ** mit ingenieurwissenschaftlichem Schwerpunkt

Master



1. Competency Orientation in Higher Education

Correlation: test values / GPAs



$r=-0,024$ ($p=0,36$),
 $N=1495$ (25 Universitys)

▶ Certifications and rankings lack objectivity and validity

▶ Extreme differences in evaluation and standardization

▶ Certificates and grades hardly comparable

▶ Increasing internationalization and global mobility



Require transparency of students' knowledge and skills



Require comparability of study models and degrees



▶ *Reliable and valid assessment of competency levels and development*

▶ Lack of empirical studies in competency research in higher education



2. KoKoHs I – Purpose and Aims

“**Modeling and Measuring Competencies in Higher Education**” (KoKoHs I) national research program funded by Ministry of Education and Research (first phase 2011–2015)

Purpose

- **Fundamental, systematic and *internationally visible and compatible* research on valid competency assessment and competency development in higher education in Germany**

Aims

- **Modeling** domain-specific and generic **competencies** in selected subjects
- Transforming theoretical models into suitable **measuring instruments**
- **Validating** test instruments and test score interpretations

2. KoKoHs I – Structure and Projects

220 researchers at over 50 higher education institutions in Germany and in Austria



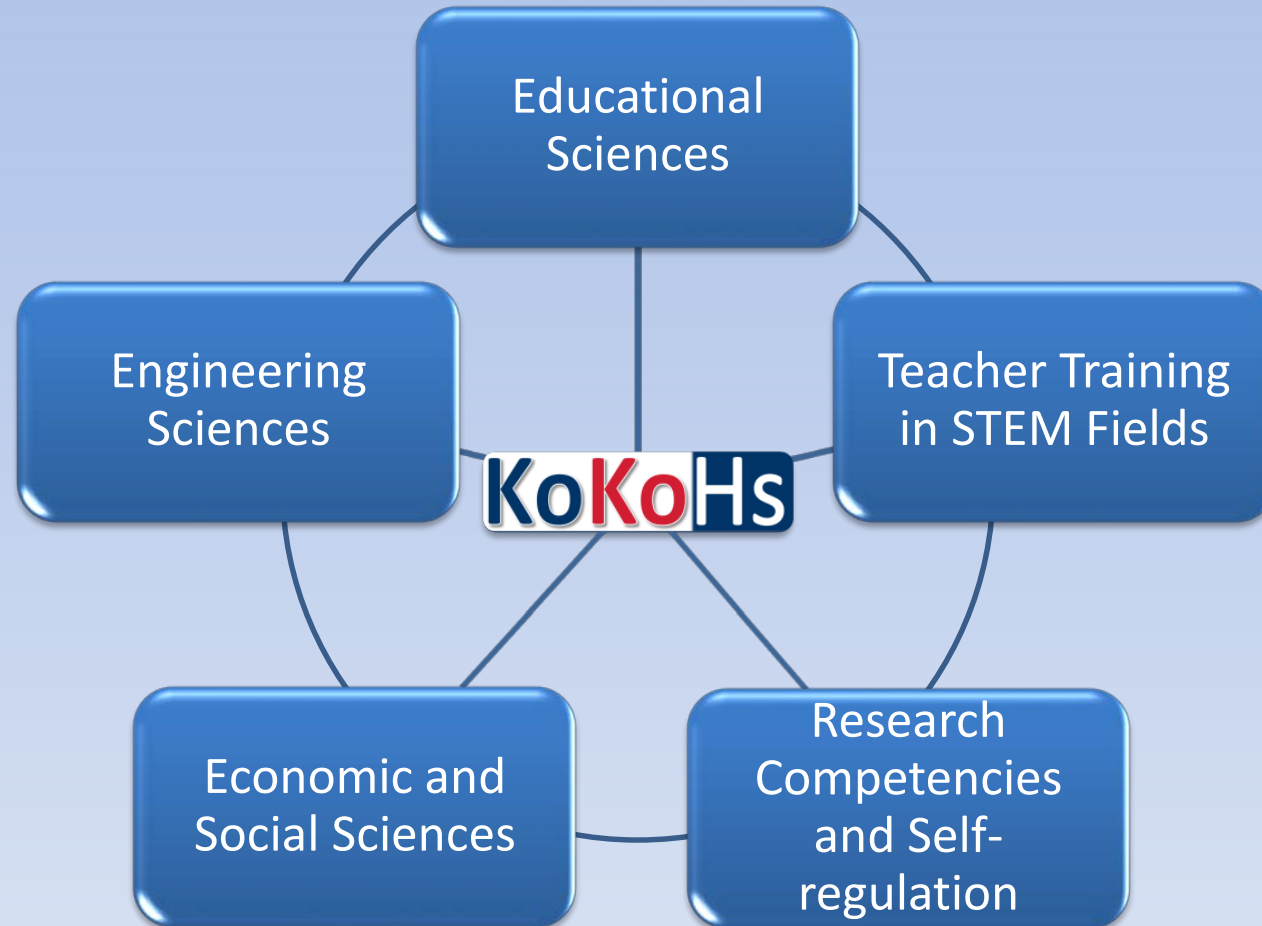
Coordination Project
Hans Anand Pant
Olga Troitschanskaia



About 70 projects in 24 project alliances
in higher education in Germany

International scientific advisory board

International cooperation partners



KOM-ING

Engineering Sciences

- Modeling and measurement of competencies of engineering mechanics in the training of mechanical engineers

BilWiss

Educational Sciences

- Broad pedagogical knowledge and development of professional competence in teacher education

WiwiKom

Economic and Social Sciences

- Modeling and measuring competencies of students in business and economics by adapting and further developing existing international tests

KomMa

Teacher Training in STEM' Fields

- Assessing the structure, level and development of kindergarten teachers' professional competencies in mathematics

PRO-SRL

Research Competencies and Self-regulation

- Product- and process-oriented modeling and assessment of self-regulated learning competencies in tertiary education

3. International Perspective and Cooperation

International cooperation with over **50 international experts** from **20 countries** on **4 continents**

AERA, U.S.

CAE, U.S.

ETS, U.S.

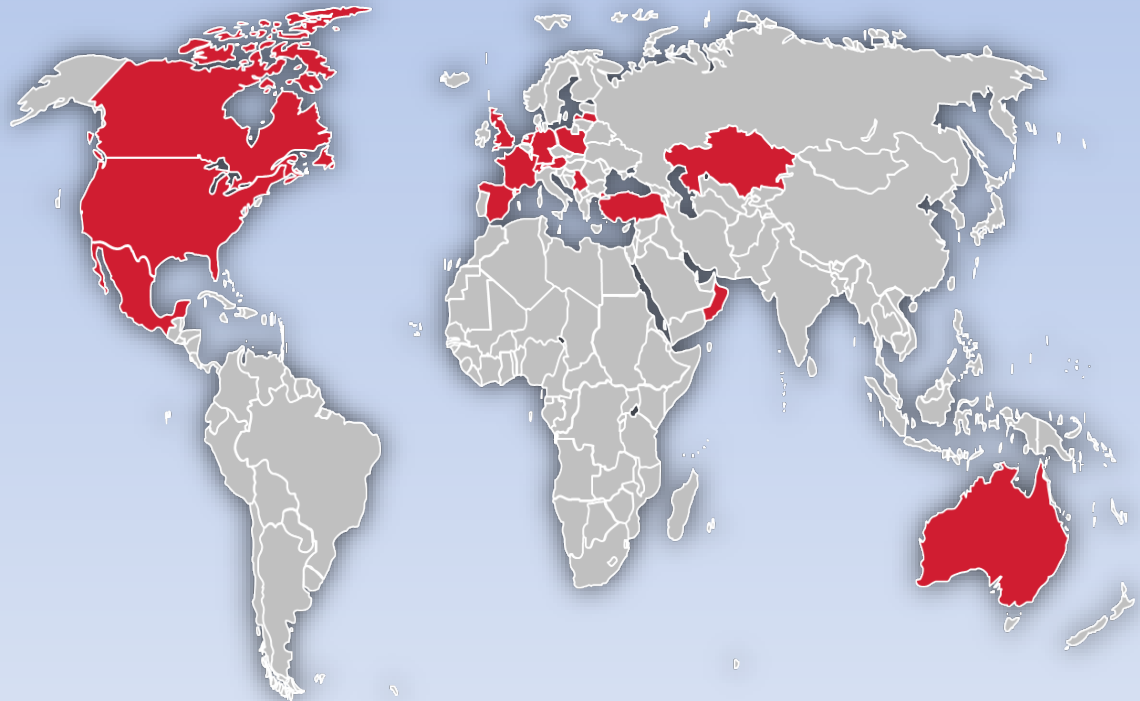
NCME, U.S.

CITO, Netherlands

ACER, Australia

OECD (AHELO), France,

Japan, South Korea ...



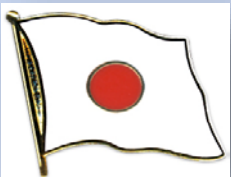
3. International Perspective and Cooperation



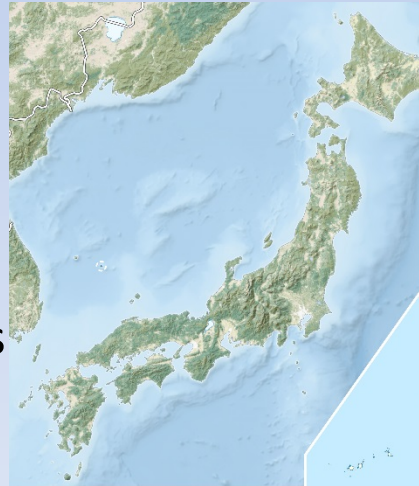
Deutschland
45 Universities
N=10.248



USA
70 Universities
N=11.059

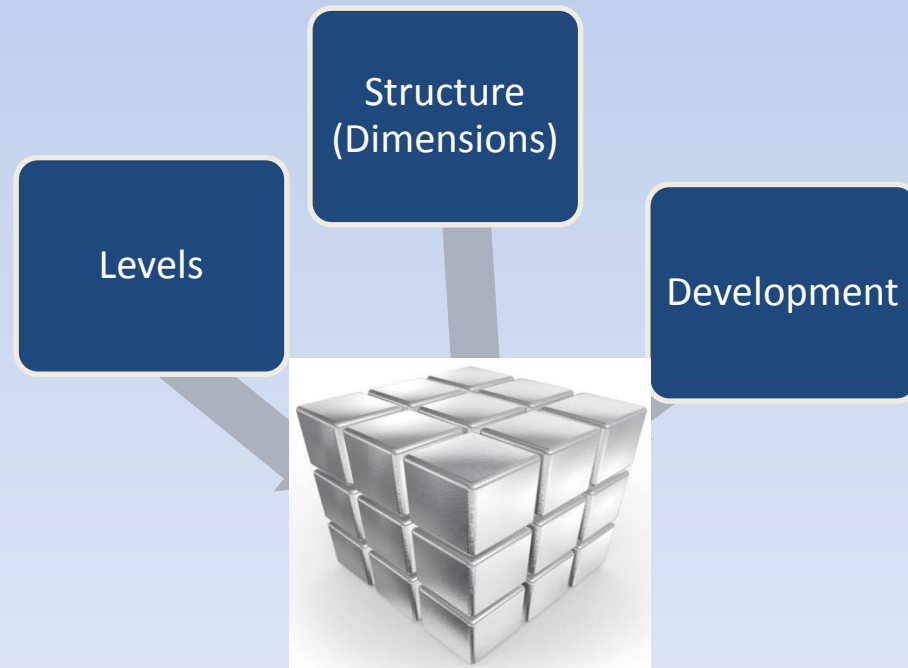


Japan
10 Universities
N=1.188

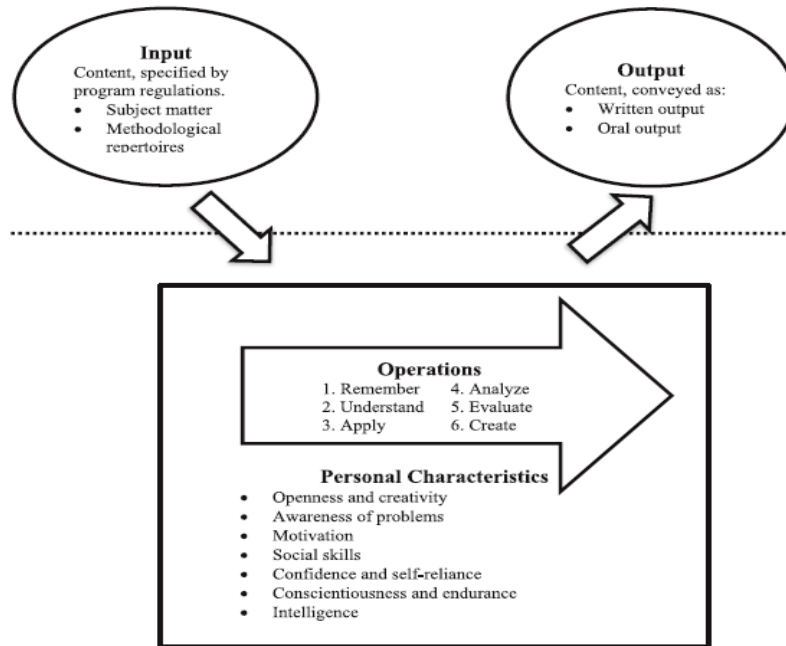


Mexiko
466 Universities
N=11.099

- Theoretical models developed as a basis for empirical assessment of competency acquisition in higher education
- Competency models transformed into measuring instruments
- Comprehensively validated

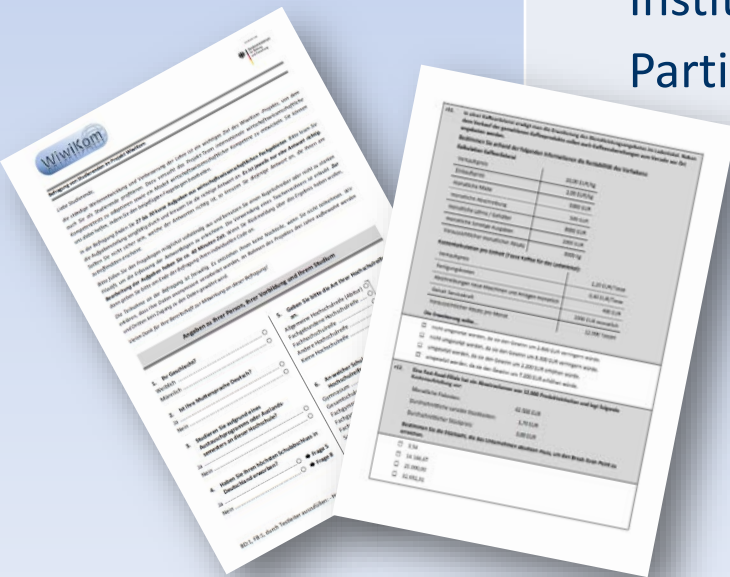


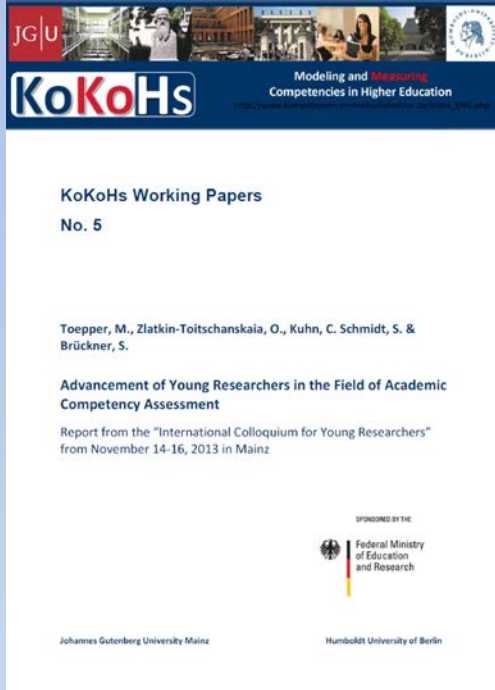
Competency Models Developed	
Theoretical competency models	41
Document analyses	910
Curricula, regulations, standards	1350
Exams, exercises, lecture notes	48
Project and lab reports	
Validation	556
Expert interviews	459
Cognitive labs	



Competency Assessments Conducted

Instruments	
Paper-pencil tests	63
Computer-based formats	36
Video-based formats	8
Other formats (e.g. critical incidents)	119
Assessment surveys	
Institutions	226
Participants	49904





64 dissertations and 19 habilitations

New scientific community conducting empirical research in higher education

Systematic and sustained promotion of young researchers through various opportunities for training, networking and exchange





4. KoKoHs I – Overview of Results

Items that adequately represent curricular and job-related features, developed by interdisciplinary teams

Comprehensive validation of items

Pilot studies for testing psychometric properties

as well as

New scientific community in the area of competency assessment in higher education

International networking

KoKoHs II: Models and instruments of competency assessment in higher education – validation and methodological innovations (second phase 2016-2020)

Focus

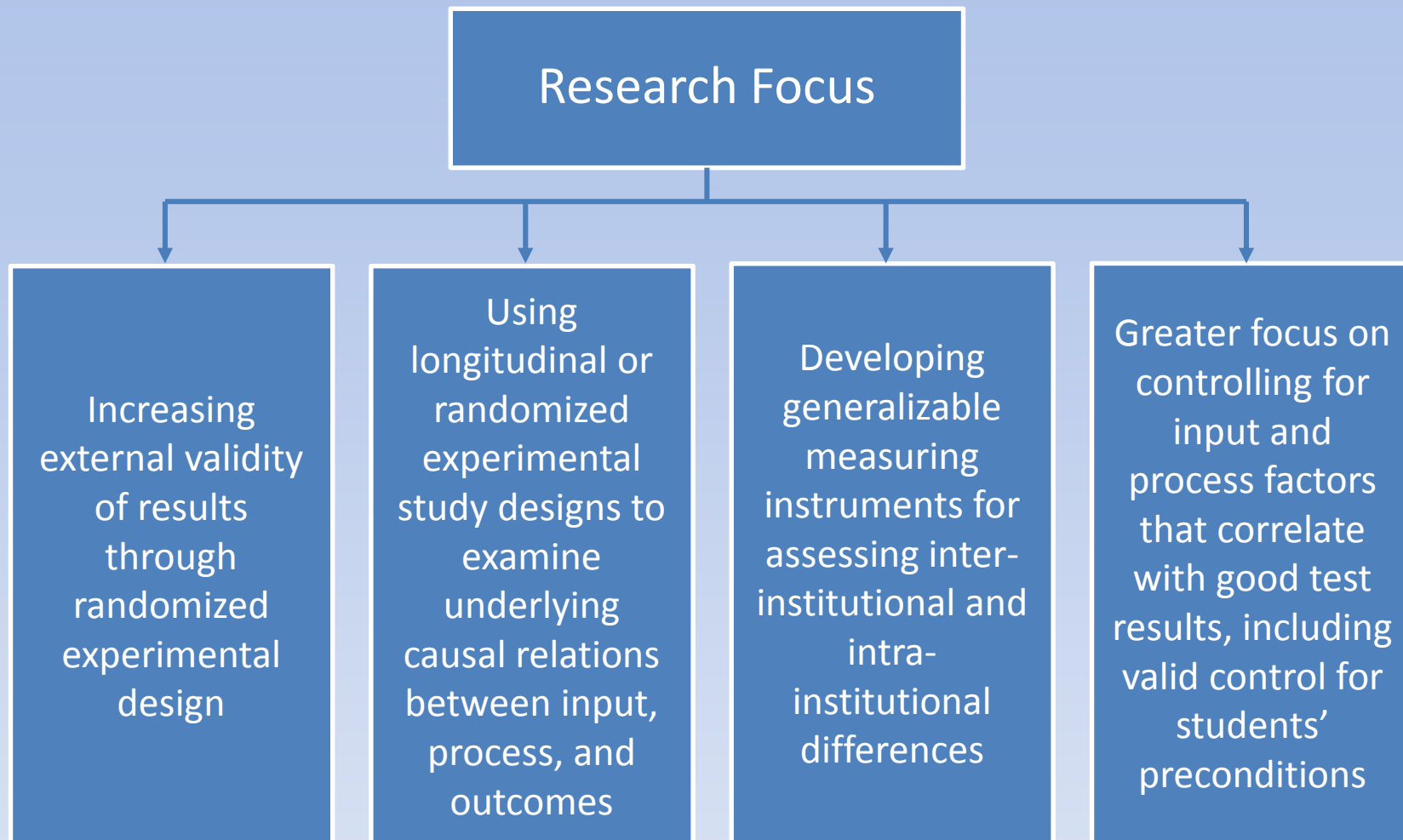
In-depth validation of competency models and instruments (*relationships to other variables and consequence of testing*)

Innovative methods of competency assessment (innovative research designs, operationalization, item formats)

Transfer of validated competency models and empirically tested measuring instruments into other domains

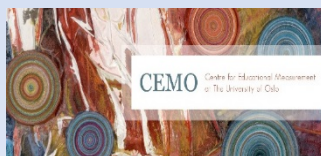
Competency acquisition and change over time

(International) comparing studies



Specific problems in higher education

- Problems of reliability due to limited testing time for complex models
 - Problems of panel mortality in longitudinal study
 - Problems of testing based on students performance
- ➡ Consider innovative more complex methods of analysis
- ➡ Draw on best practices from other projects and expertise of international partners, e.g. ETS, CAE, ACER,...
- ➡ Strengthening international collaboration in the research field of competency assessment in higher education



ROA



Thank you!



www.kompetenzen-im-hochschulsektor.de



www.wiwi-kompetenz.de

Weinert (2001) defines competencies as

“cognitive abilities and skills that individuals possess or acquire in order to solve certain problems as well as the aligned motivational, volitional and social dispositions and skills to apply the solutions in different situations successfully and responsibly“ (p. 27-28).

- Competencies as the latent cognitive and affective-motivational underpinnings of performance (Shavelson 2013)
- Holistic view
- However, limitations were necessary for practical reasons:
Focus on cognitive abilities and skills

2. KoKoHs I – Concept of Competence

Disposition

- Differs from performance on the job

Changeable

- Learning and forgetting determines level

Relatively stable

- Over time and within situations

Domain-Specific

- Differs from intelligence and general cognitive abilities
- Related to a single courses of studies or spanning various courses of study

Depends on Situational Requirements

- Not necessarily curricularly valid, also institutional and job-related variability

Multidimensional

- Various cognitive and non-cognitive abilities and skills

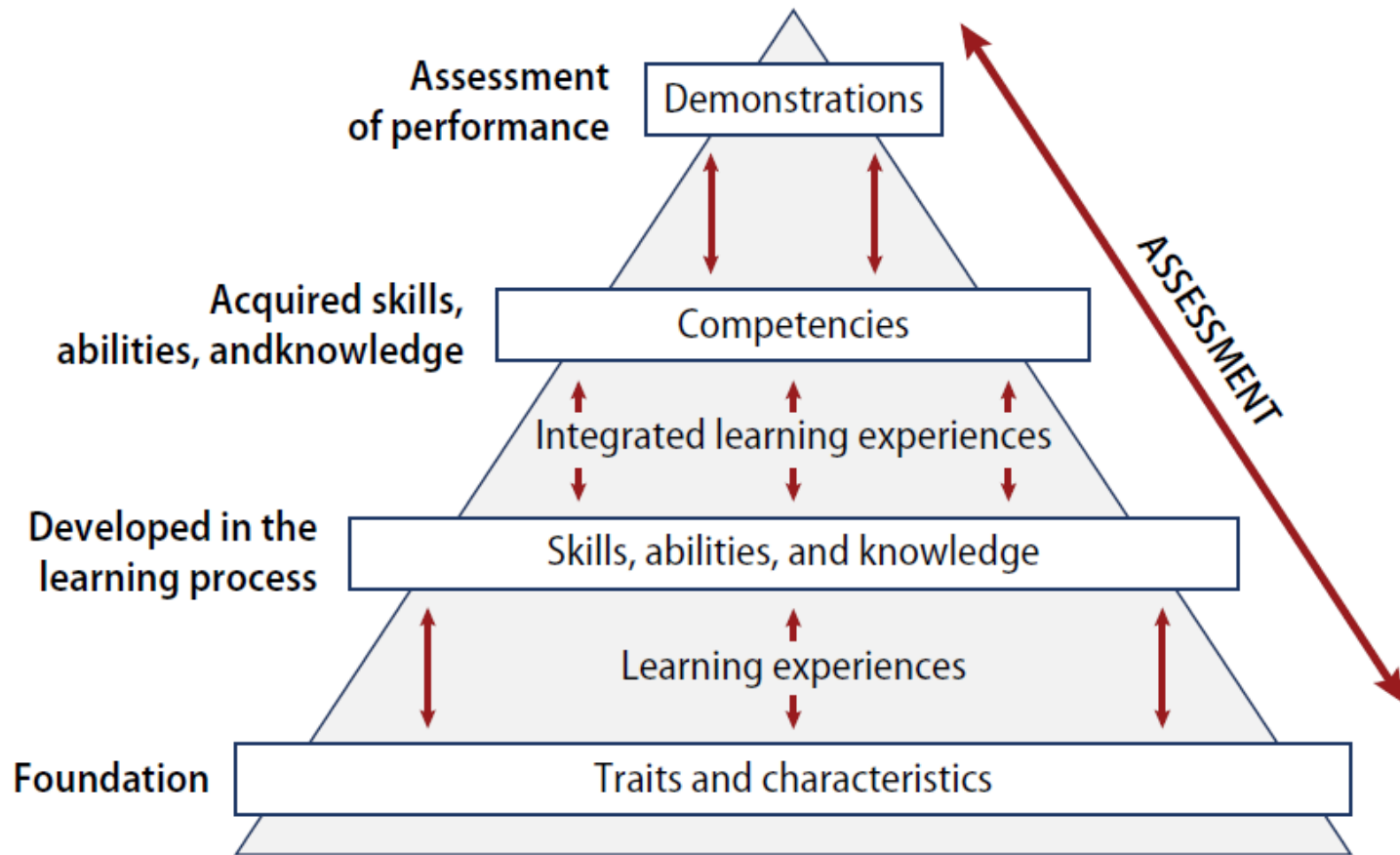
Latent

- Not directly observable, requires interpretation

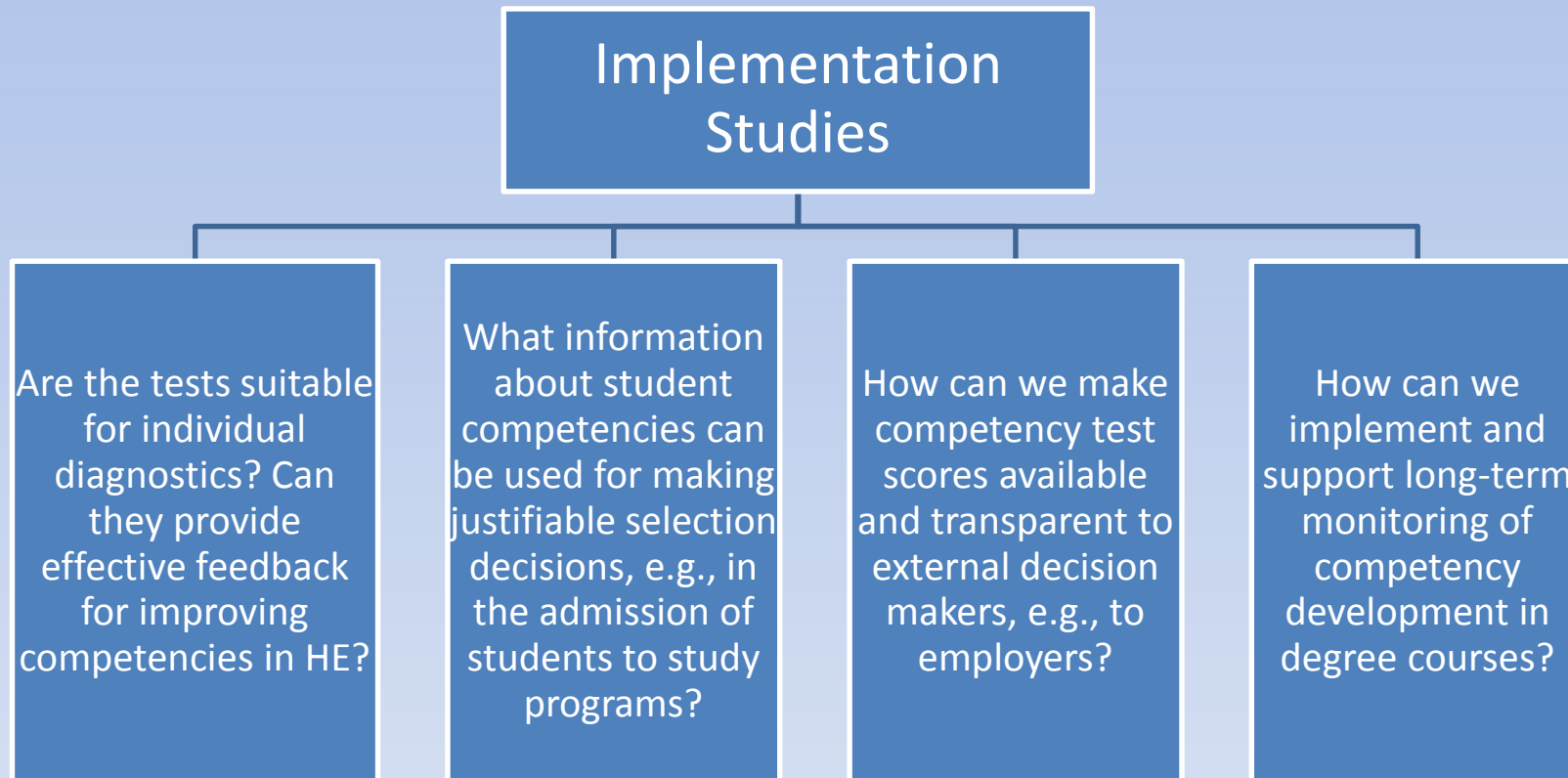
Evidence-based

- High and low ability levels, based on varying criteria

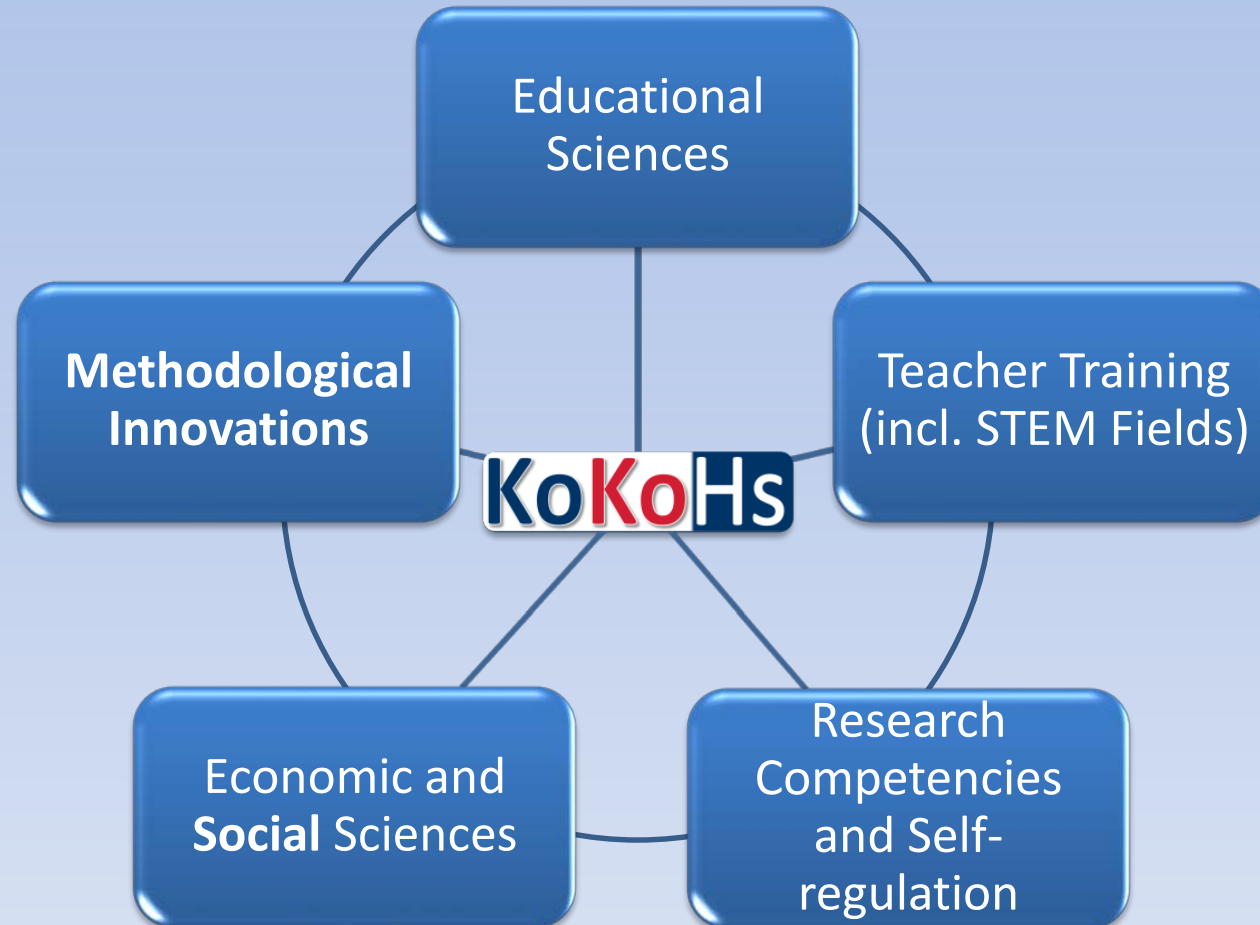
A conceptual learning model



- Use of tests and interpretations in higher education practice

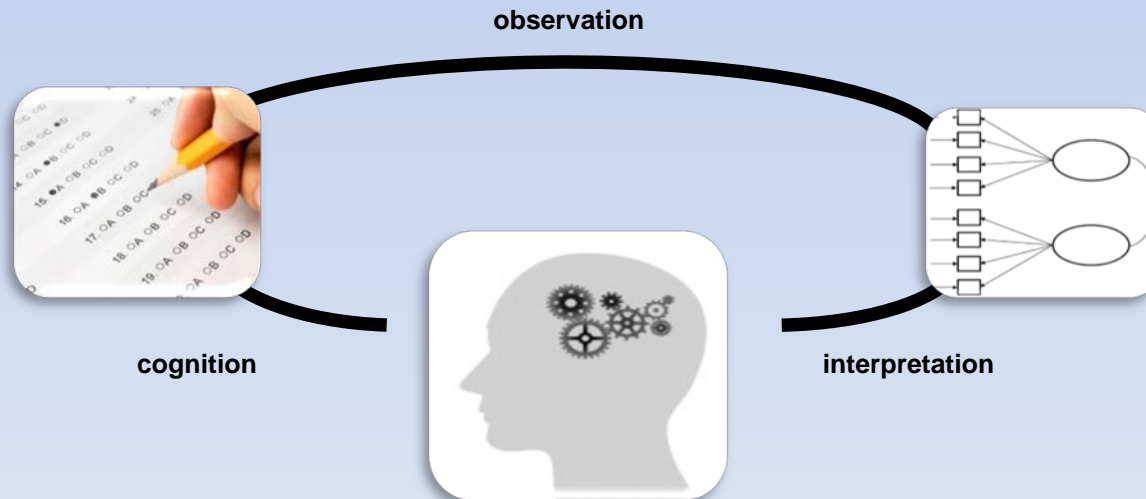


Project Results Disseminated	
Publications	
National	134
International	65
Presentations	
National	244
International	89
Topical issues	
National	4
International (e.g. in Studies in Higher Education, Assessment and Evaluation in Higher Education)	5
KoKoHs working papers	9
(6 in English)	



“Assessment Triangle” by Pellegrino, Chudowsky & Glaser (2001)

“a model of student *cognition* and learning in the domain, a set of beliefs about the kinds of *observations* that will provide evidence of students’ competencies, and an *interpretation* process for making sense of the evidence” (p. 44).



(Pellegrino et al., 2001)

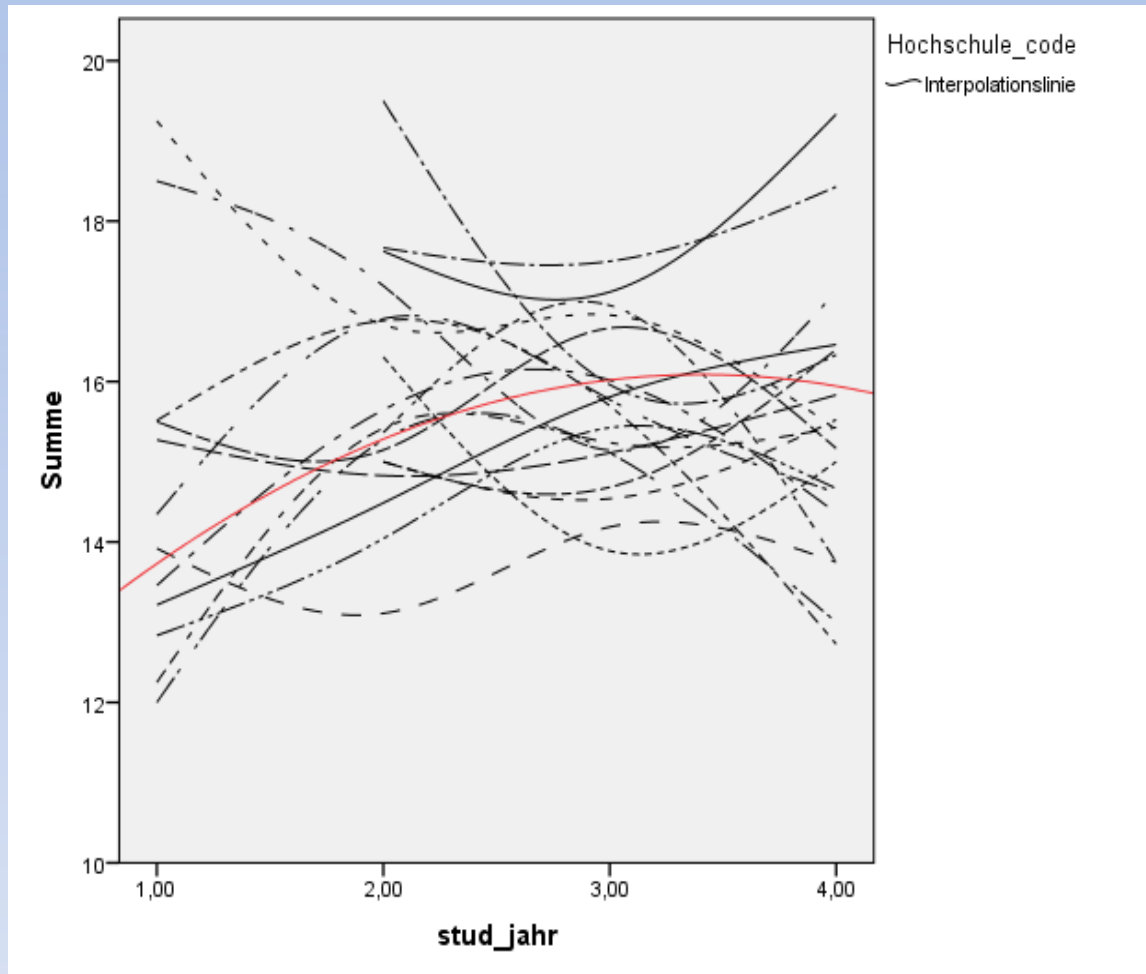
1. Defining the construct to be assessed (*cognition*)
2. The development of suitable models and measuring instruments (observation) and
3. The conclusions drawn from the assessment data (*interpretation*)

(Marion & Pellegrino, 2006; Pellegrino, Chudowsky & Glaser, 2001)

4. Kompetenzmessung in der ökonomischen Ausbildung



Variationen in den Testwerten



4. Kompetenzmessung in der ökonomischen Ausbildung

