

# Status of competence research in Germany: approaches and results

Conference “Competence 2016: Competence Theory,  
Research and Practice”

Wageningen University  
20<sup>th</sup> October 2016

Competencies are defined “as context-specific cognitive dispositions that are acquired by learning and needed to successfully cope with certain situations or tasks in specific domains.”

Source: Klieme / Leutner 2006

## Definition: Heinrich Roth

Heinrich Roth views competencies as individual abilities in terms of dispositions for action and judgement. Maturity (“Mündigkeit”) as educational aim should therefore be interpreted as

- self-competence
- professional competence
- social competence.

Source: Roth 1971

# Competencies within the concept of „learning aereas“

Professional competencies

Social competencies

Human (personal) competencies

Source: KMK 1996

# Definition in Germany's Qualification Framework (DQR)

“The concept of competence (...) forms the umbrella for all learning outcomes being considered. It describes the ability and readiness to use knowledge, skills and personal, social and/or methodological abilities in work or study situations and in professional and personal development. (...) Competence is understood in this sense as the comprehensive ability to act. (...) The concept of ‘competence’ in the DQR can therefore be connected with the concept of the professional ability to act which is characteristic of vocational education and training in the dual system.”

Source: BMBF / KMK 2013

# Germany's Qualification Framework: Four-pillar structure

<i>Professional competence</i>		<i>Personal competence</i>	
<i>Knowledge</i>	<i>Skills</i>	<i>Social competence</i>	<i>Autonomy</i>
Depth and breadth of knowledge	Competence in using instruments, systematic learning and working, assessment	Teamwork and Leadership competences, involvement and communication	Autonomy in thinking and acting, sense of responsibility, reflectiveness, learning competence

Source: AK DQR 2011

„The role of educational research (...) is to render (...) educational productivity *measurable*, to develop models that can explain how educational process take place, evaluate their effectiveness and efficiency, and propose and analyze strategies for intervention.“

Source: Klieme / Hartig / Rauch 2008

# Participation at (international) large scale assessments

- Program for International Student Assessment (PISA)
- Third International Mathematics and Science Study (TIMMS)
- International Computer and Information Literacy Study (ICILS)
- International Civic and Citizenship Education (ICCS)
- International Adult Literacy Survey (IALS)
- Adult Literacy and Life-skills Survey (ALL)
- Progress in International Reading Literacy Study (PIRLS)
- Program for the International Assessment of Adult Competencies (PIAAC)
- Level-one-study: Literacy of adults on low competency levels (LEO)
- Assessing student learning outcomes in higher education: challenges and international perspectives (KoKoHs)
- ...



# Studies and Programs in VET-research

ULME

Longitudinal-study: Learning performance, motivation and attitudes of students at Vocational Training Schools in Hamburg

VET-LSA

Feasibility-study: Development and implementation of a large scale assessment on professional competences of apprentices

COMET

Research project: Development and Measurement of Competencies in Electrical and IT-professions

ASCOT

Research program: Technology-based Assessment of Skills and Competences in Vocational Education and Training

# VET-PISA: Panel-construction

	Panel construction: First wave	Panel: Second wave	Panel: Third wave
Assessment of competencies	Competencies at the beginning	Learned competencies through VET	Improving competencies at the workplace (after VET)
Institutional data	Context and framework	Characteristics of VET (f.e. learning climate, organisation of VET, ...)	Transition to work, conditions of work
Individual data	For example: educational aspiration, learning condition	For example: Work experience, attitudes to learning and working	For example: Achieved certificates, carrier position, income, mobility, continuing training

Source: Baethge / Achtenhagen 2006

The memorandum “diagnoses of competences in vocational education and training” suggests a concentration on four main tasks of future research:

- Modelling of competencies,
- Validation of instruments, certificate and examinations,
- Development of competencies in the live cycle,
- Analyzing the influence of starting conditions, framework and learning processes on the structure of competencies and their development.

Source: BIBB 2010

Ascot

[www.ascot-vet.net](http://www.ascot-vet.net)

ASCOT = Technology-based **A**Sessment of Skills and **C**ompetencies in Vocational Education and **T**raining

# Structure of ASCOT

## Specific, professional competencies in six professions

### Commercial professions

- Industrial clerk
- Freight forwarding and logistics services clerk

### Technical professions

- Car mechatronics technician
- Electronics technicians for automation technology

### Health care professions

- Medical assistant
- Elderly care nurse

## General, comprehensive competencies and context

- Adaptive measurement of general competencies (Reading / Mathematik / Science)
- Context factors of VET

Source: Baethge /  
Seeber 2016

# ASCOT: Characteristics of the Program

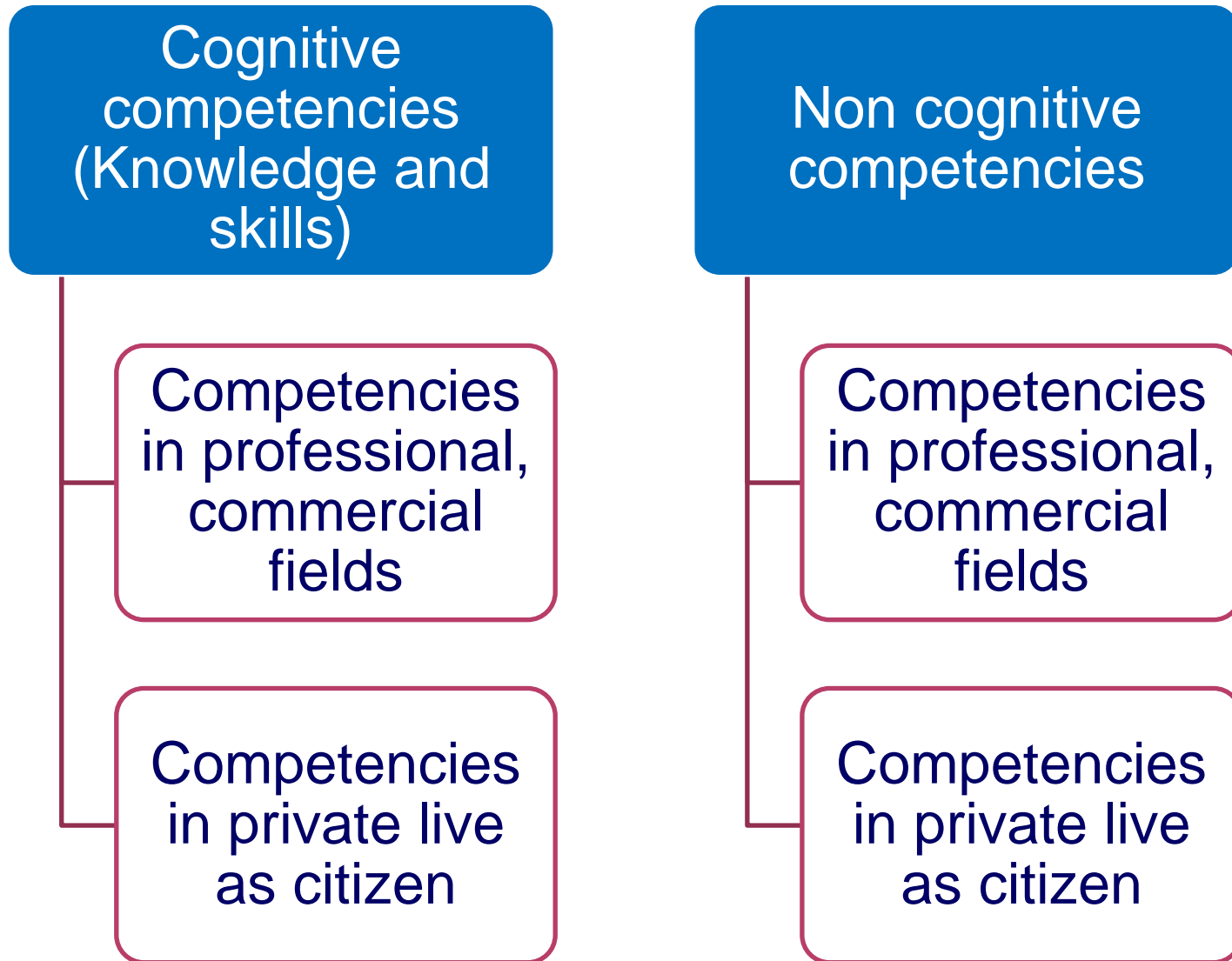
- Financing: Federal Ministry for Education and Science
- Aim: developing test instruments for the assessment of VET-competencies using technology-based instruments
- Focus on three professional groups and six professions
- Two projects on general competencies and context factors („Cross-section projects“)
- Contracts with six national networks of researchers / 21 research projects
- Duration: December 2011 to May 2015
- Probabilistic test theory: Item response model
- Theoretic basis: psychology of cognition
-



# Test development: Five steps

1. Analyses of the professional domain (for example: analyses of curricula and training regulation, interviews with experts, teachers and trainers)
2. Identification of central professional requirements, working tools and outcome
3. Development of models of professional competencies
4. Development of test items
5. Development and validation of test instruments (for example: computer based simulation)

# Model of Economic Competencies



Source: Eberle et al, 2016



# Model of commercial competencies

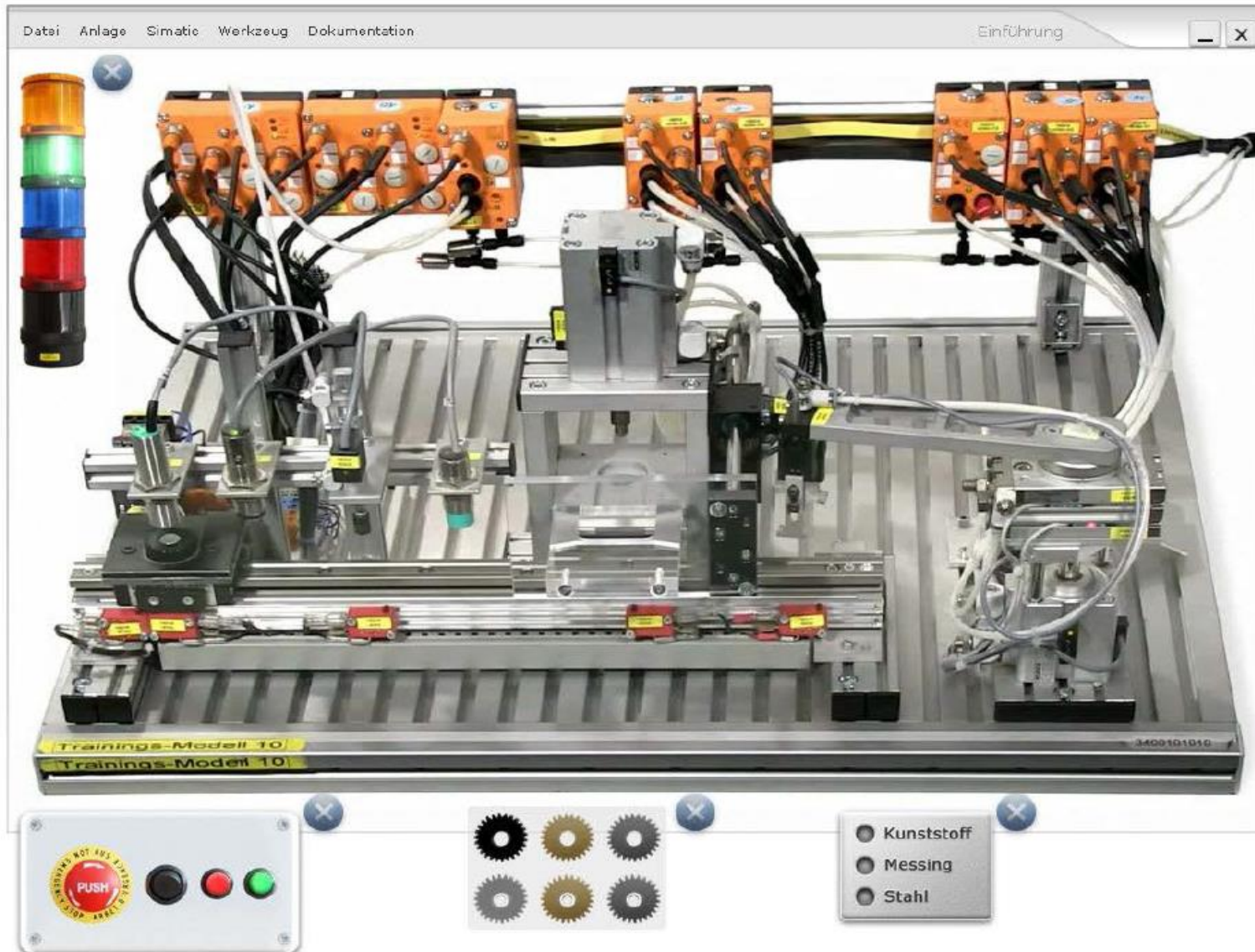
Commercial literacy  
(general,  
comprehensive  
competencies to fulfil  
professional  
requirements of  
industrial clerks)



Business process  
competencies  
(specific, vocational  
competences to fulfil  
professional  
requirements of  
industrial clerks)

Source: Winther et al, 2016

# Example: Technology-based simulation



Source:  
Nickolaus  
et. al 2011

# The COMET model of competence

Levels	Criteria		
Holistic competence to create and develop	Sustainability / environment protection	Creativity	Social acceptance / credibility
Conceptional competence to organize processes	Efficiency	Benefits for user	Orientation on work processes
Functional competence	Functionality		Clearness of the presentation

Source: Rauner et. al. 2009, 88



# Tasks for future research and development

- Transfer of projects and test instruments to large assessment studies
- International comparison of competencies
- Detailed analysis on interventions and their effects on competencies
- Adaption of test instruments to the needs of teachers and trainers
- Development of competence based curricula and training regulation
- Comparison of instruments and results of validation / certification in companies, vocational training schools or responsible bodies with instruments and results from competency research
- Development of competence based training standards
- Use of test instruments for the validation of nonformal / informal competencies
- Transfer of tests instruments to certification processes and final examinations



# From ASCOT to ASCOT+

Transferring test instruments and test results from ASCOT on the assessment of competencies to different applications:

- Development of competence based curricula and training standards
- Implementation of test instruments for the quality management of vocational schools and organisation of training in companies
- Using test instruments for the validation of competencies learned in nonformal or informal settings
- Adaptation and use of test instruments in final examinations



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