IEA Specific Approach to the Assessment of Educational Achievement:

The TEDS-M experience

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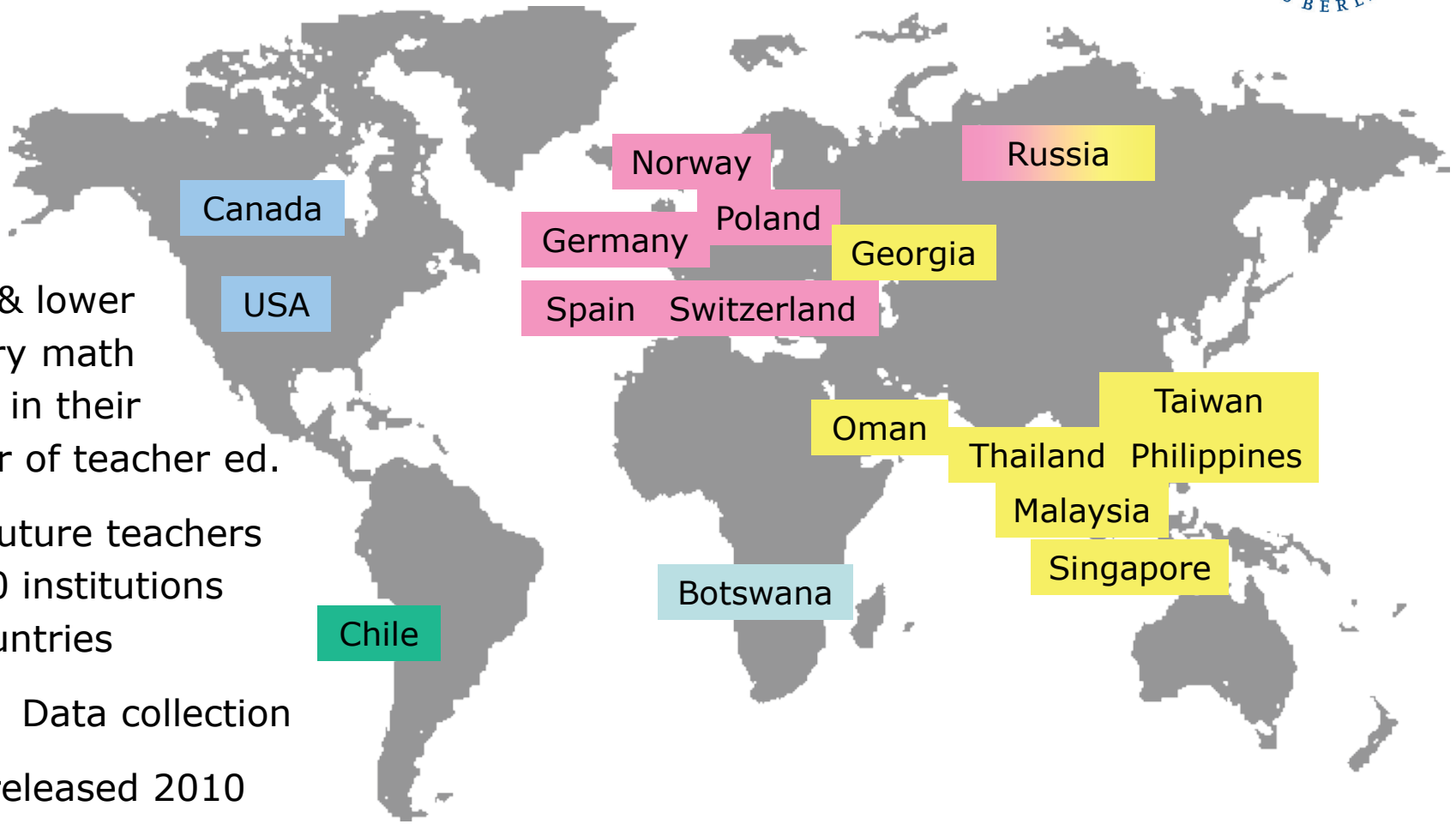
A reminder: What was TEDS-M?



Primary & lower secondary math teachers in their final year of teacher ed.

23.000 future teachers from 800 institutions in 17 countries

2007/08 Data collection

Results released 2010

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Challenges of the first study in HE

Gap between research groups: experts on student achievement not familiar with higher education, higher education experts not familiar with assessments **– TEDS-M built up new communities**

Theory gaps: assessing teacher competencies as predictors of student achievement requires a model of teacher education effectiveness *and* a model of teacher effectiveness **– finally done**

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Theory gaps: assessing teacher competencies as predictors of student achievement requires a model of teacher education effectiveness *and* a model of teacher effectiveness – finally done

Objections: first cross-country study of higher-education outcomes with a standardized approach (see PISA criticism) **– resolved**

Hesitations: TEDS-M is about „us" **– resolved (can be regarded as an indicator of content validity)**

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Challenges of the first study in HE

Concerns about the common IEA quality criteria: sampling, response rates **– difficult but at least partly resolved**

11 (primary) or 9 (lower-secondary) countries CPR > 75%,
4 or 6 countries > 60% and reported with annotations
(but Norway with a different sample definition and the U.S. with >20% missings on crucial variables), Canada had to be excluded

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Discussions about the unit of analysis (country vs. program type): **controversy about comparability only partly resolved** – several countries used both, ISC used program type level

Challenges of the first study in HE

Discussions about the *nature* of mathematics pedagogical content knowledge and what to assess: partly resolved – **countries agreed on focus on student errors,** PCK more strongly related to *C* than to *P* (lack about consensus and items)

Challenges of the first study in HE

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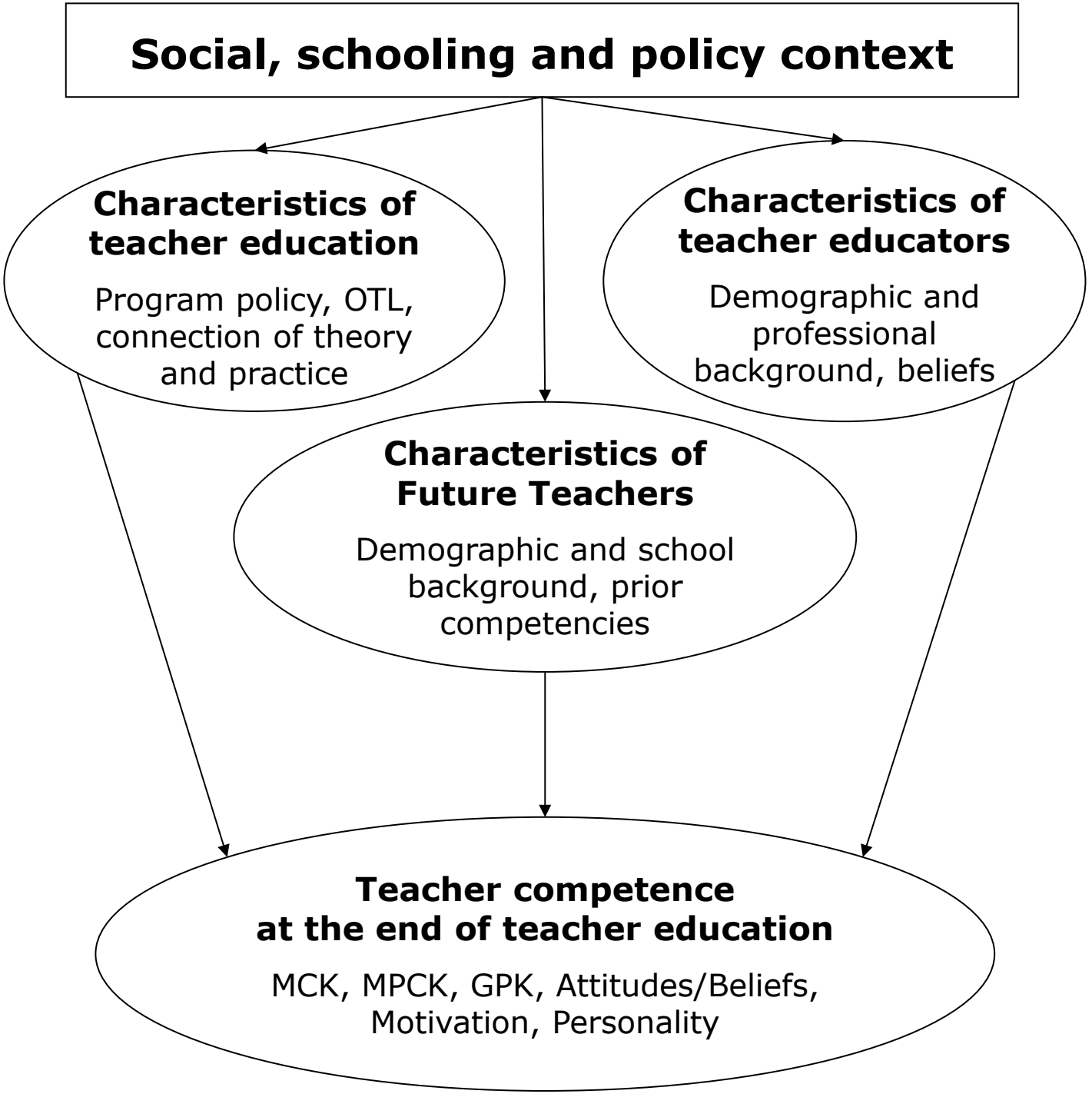
Discussions about the nature of general pedagogical knowledge and what to assess: not resolved (again lack of consensus and items) **– two versions applied as national options**

Challenges of the first study in HE

Summary #1: Discussions have considerably moved forward higher education research

- conceptually (framworks, constructs)
- methodologically (new instruments)
- operationally (reduced reluctance, proved that it can be done)

TEDS-M Conceptual framework



(Tatto et al., 2008)

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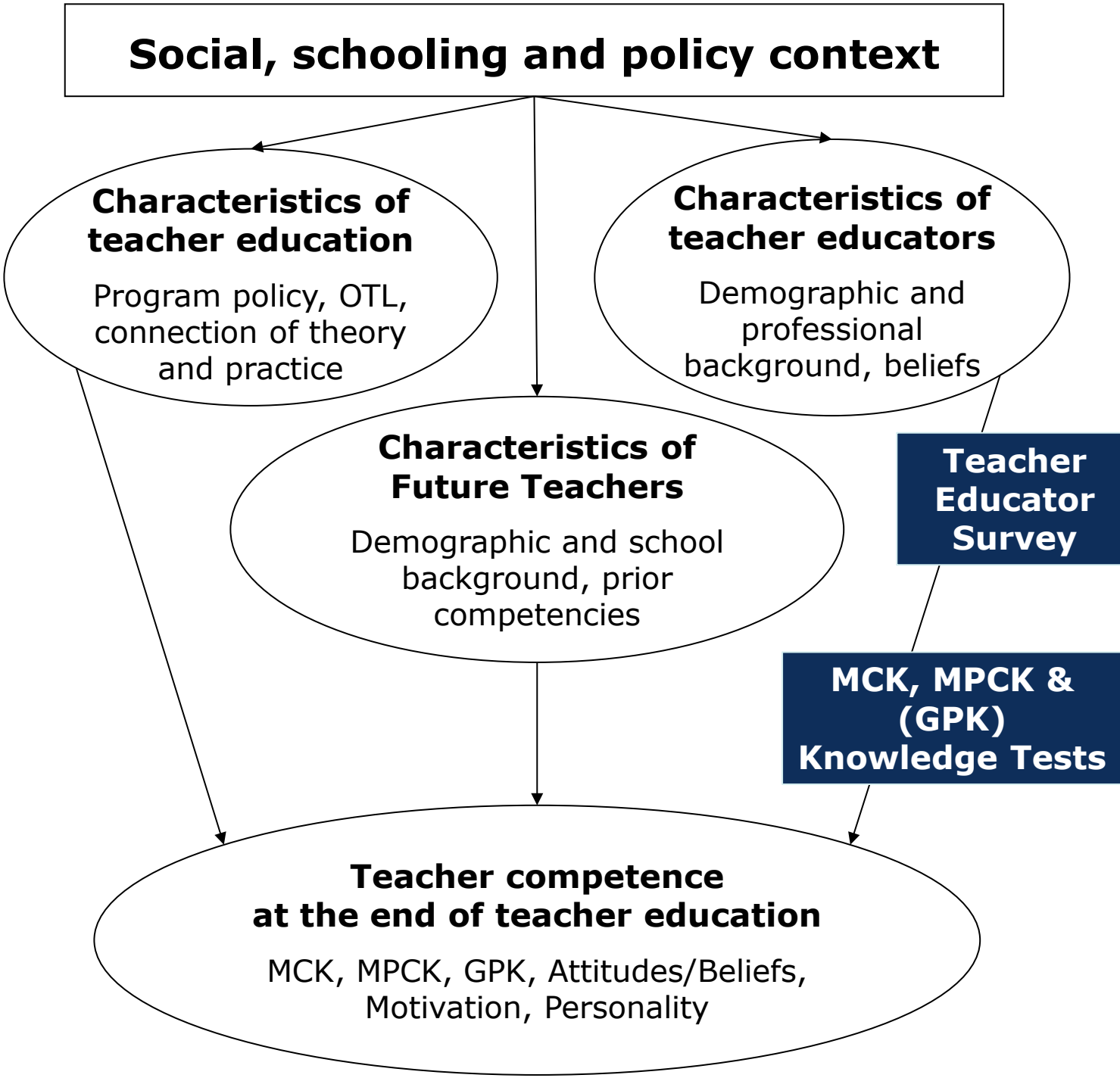
TEDS-M Conceptual framework



Institu-tional Survey

(Tatto et al., 2008)

Future Teacher Survey

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Assessment of teacher competence

MCK and MPCK tests

- about 100 items in each study (primary/ lower secondary)
- 70 MCK and 30 MPCK items, 5 or 3 booklets, BIB design
- number, algebra, geometry (about equal weight) and data
- recalling, applying and reasoning (similar to TIMSS)
- mostly MC or complex MC, few constructed-response items
- separate 1-par Rasch models for MCK and MPCK

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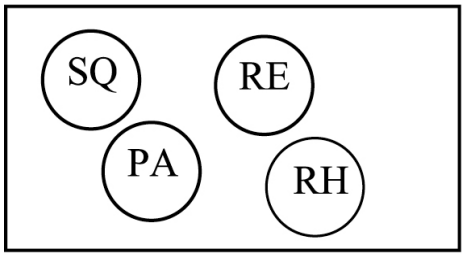
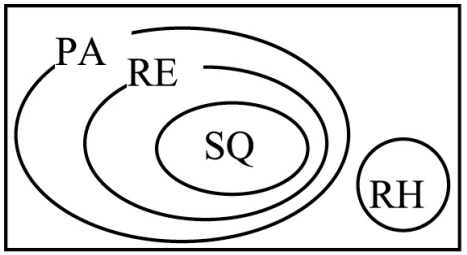
Assessment of teacher competence

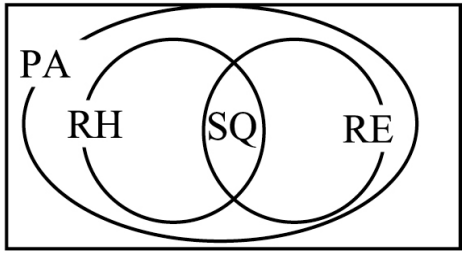
Three students have drawn the following Venn diagrams showing the relationships between four quadrilaterals: Rectangles (RE), Parallelograms (PA), Rhombuses (RH), and Squares (SQ).



[Tian]



[Rini]



[Mia]

Check <u>one</u> box.

A. [Tian] o_1

B. [Rini] o_2

C. [Mia] o_3

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Assessment of teacher competence

When teaching children about length measurement for the first time, Mrs. [Ho] prefers to begin by having the children measure the width of their book using paper clips, then again using pencils.

Give **TWO** reasons she could have for preferring to do this rather than simply teaching the children how to use a ruler?

Significant and acceptable reasons:

Understanding of what *measurement* is (any object/unit can be used)

need for standard units (by creating uncertainty about length)

choosing most appropriate unit (using objects of different lengths helps)

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Assessment of teacher competence

TEDS-M GPK test		Cognitive processes involved		
		recalling	understanding/ analyzing	Creating/ generating
GPK dimensions	structuring			
	motivation/ management			
	adaptivity			
	diagnosing			

About 80 MC, CR and OR items assessing GPK
=> Validity confirmed in Germany, Taiwan, U.S.

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Assessment of teacher competence

Imagine you are helping a future teacher to evaluate her lesson because she has never done this before. To help her adequately analyze her lesson, what question would you ask? Formulate ten essential questions and write them down.

1) ***Do your students have prior knowledge about the subject?***

2) ***What are your objectives?***

3) ***Are the students working individually or in groups?***

…

10) ***Have your students gained the knowledge from the lesson?***

(genuine response from the U.S. TEDS-M study of middle school teachers)

(König & Blömeke, 2009, 2010, 2012)

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Three-level model of future primary teachers' MCK regressed on teacher education (Blömeke et al., 2011)

(Level 1: Future teachers, level 2: Institutions/programs, level 3: countries (fixed effects))

	M0
Individual	
Gender	25.5***
Parent ed.	2.2*
Language	ns
School GPA	10.3***
School math	9.8***
Ped. Motive	-4.7***
Subj. Motive	14.4***
Extr. Motive	-7.5***
Institution	
OTL math	
OTL math ped.	
Teach method	
Selectivity	
R^2	**24.6%**

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	M0	M1	M2	M3	M4	M5	M6
Individual							
Gender	25.5***	25.0***	25.4***	25.4***	25.0***	25.1***	24.7***
Parent ed.	2.2*	2.3*	2.2*	2.2*	2.3*	2.2*	2.2*
Language	ns	ns	ns	ns	ns	ns	ns
School GPA	10.3***	10.3***	10.2***	10.3***	10.3***	9.7***	9.8***
School math	9.8***	9.7***	9.8***	9.8***	9.7***	9.7***	9.6***
Ped. Motive	-4.7***	-4.4***	-4.8***	-4.8***	-4.4***	-4.7***	-4.4***
Subj. Motive	14.4***	13.6***	14.3***	14.3***	13.6***	14.1***	13.5***
Extr. Motive	-7.5***	-7.4***	-7.5***	-7.5***	-7.4***	-7.2***	-7.2***
Institution							
OTL math		34.1*			31.5*		25.9*
OTL math ped.			23.7*		13.7†		ns
Teach method				ns	ns		ns
Selectivity						44.7**	31.9***
R^2	**24.6%**	**38.1%**	**29.5%**	**27.5%**	**40.7%**	**37.8%**	**46.3%**

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OTL math		34.1*			31.5*		25.9*
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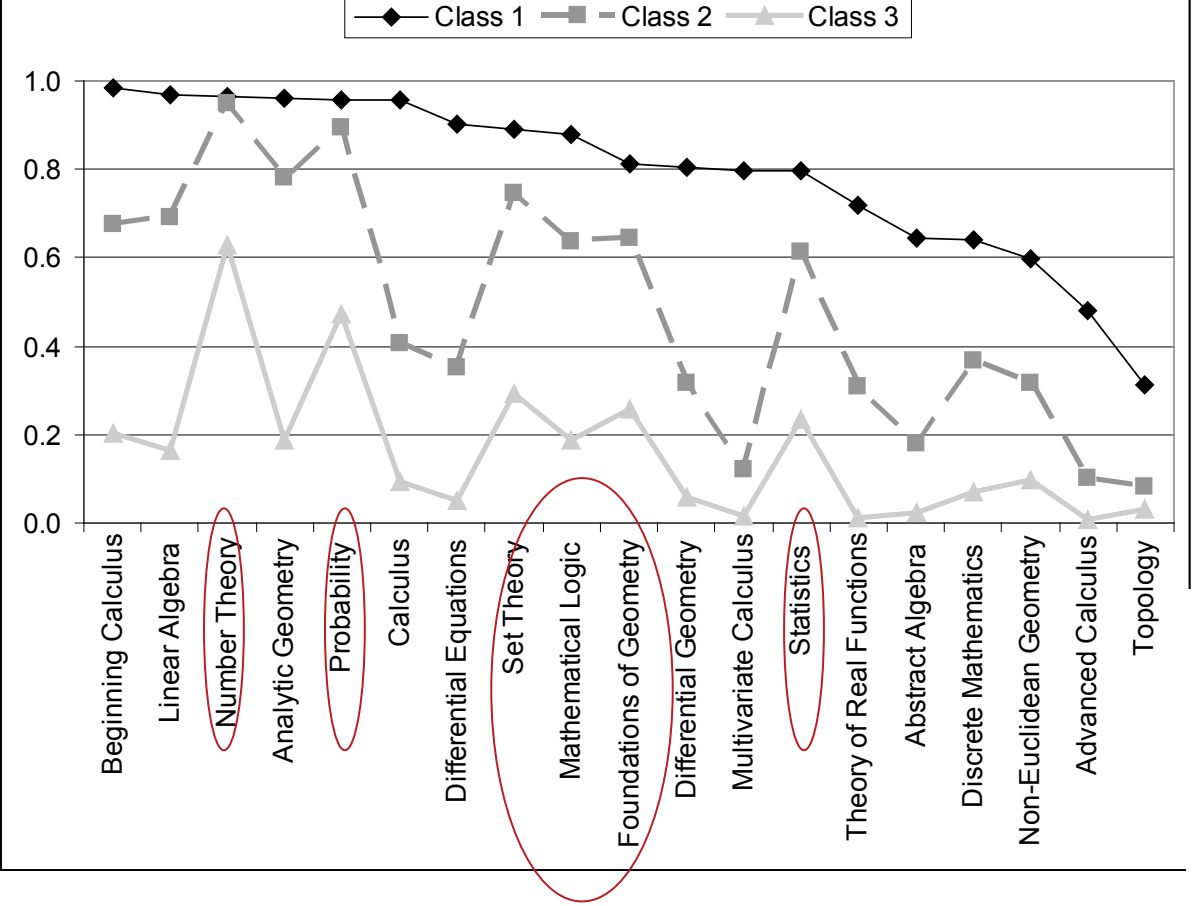
OTL in mathematics in primary teacher education across 15 countries by class

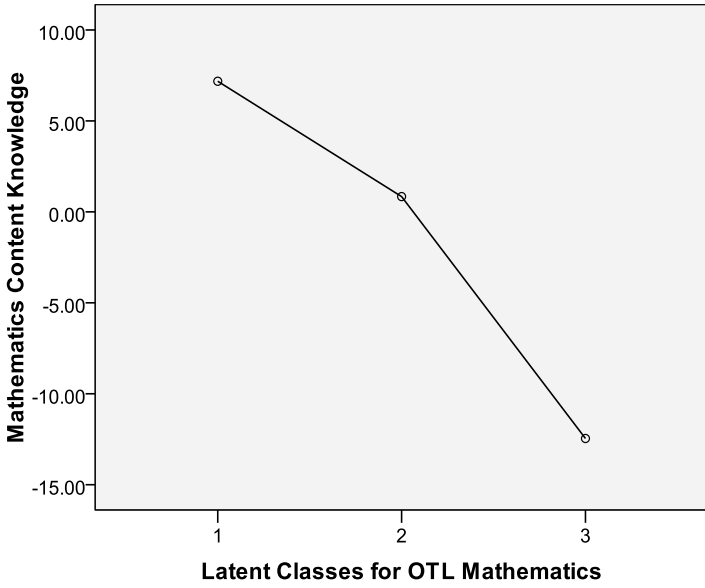
(Blömeke & Kaiser, 2012)



Class 1: Advanced university math >

Class 2: Basic university mathematics >

Class 3: School mathematics



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	M0	M1	M2	M3	M4
	B	B	B	B	**B**
Constructivist beliefs	12.43	12.41	12.42	12.43	**12.41**
Institution					
OTL math pedagogy		.46***			**.54*** **
OTL school math			.23(*)		**-.04**
OTL pedagogy				-.06	**-.17***
ICC_1	.07	.03	.05	.07	**.02**
Total R^2	–	3.7%	1.6%	0.2%	**3.9%**
Institutional R^2	–	61.3%	27.7%	2.8%	**64.6%**
Deviance	6428.5	6415.3	6427.6	6432.7	6416.8

Two-level model of Swiss future primary teachers' constructivist beliefs about teaching and learning regressed on teacher education

(Biedermann , Brühwiler & Krattenmacher, 2012)

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Teaching experience and GPK in Germany and USA

(König & Blömeke, 2012)

Class 1: novices in teaching

Class 2: autonomous teaching

Class 3: balanced experiences

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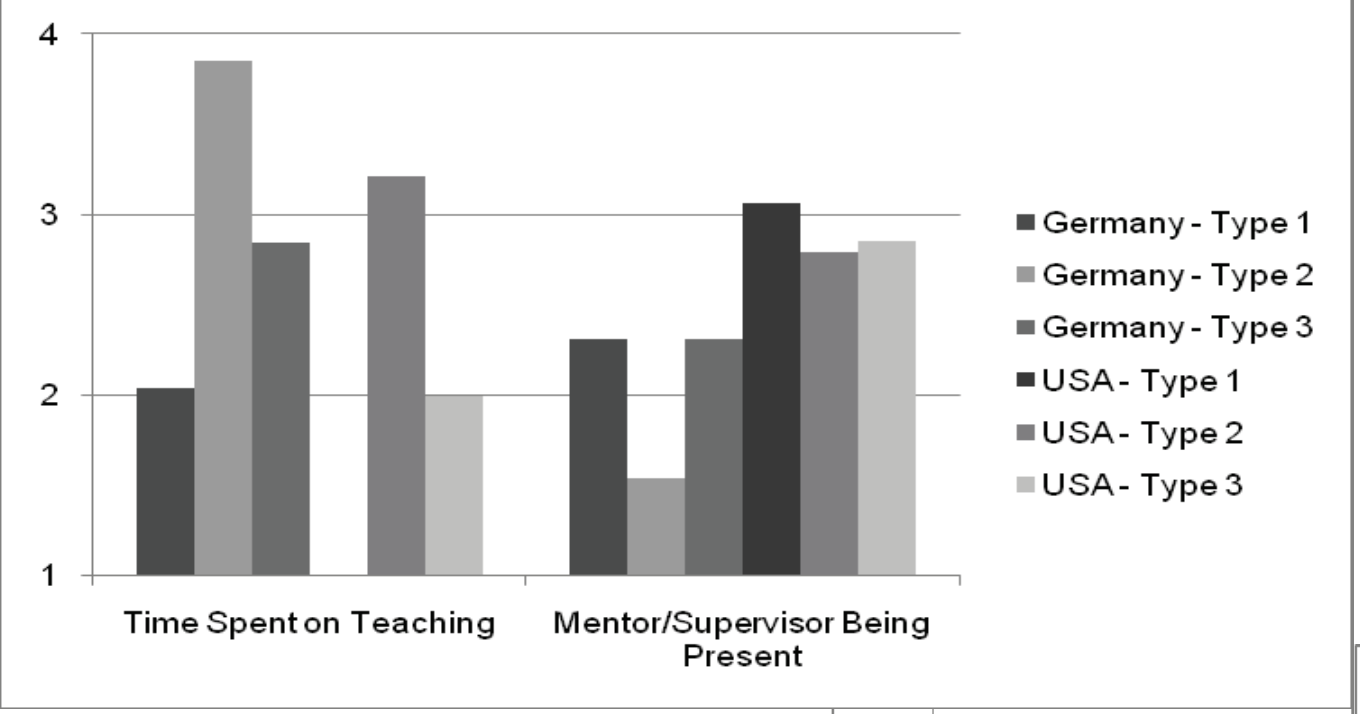

Class 1: novices in teaching

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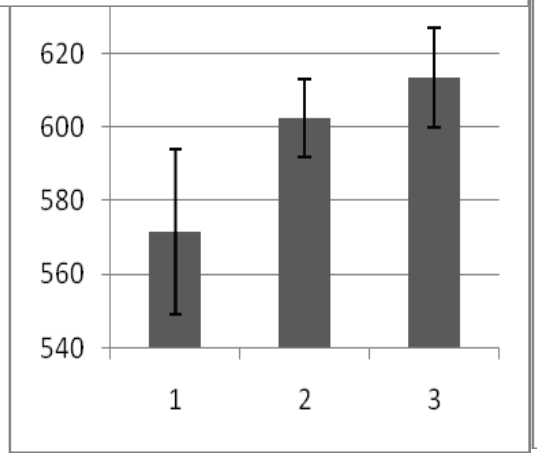

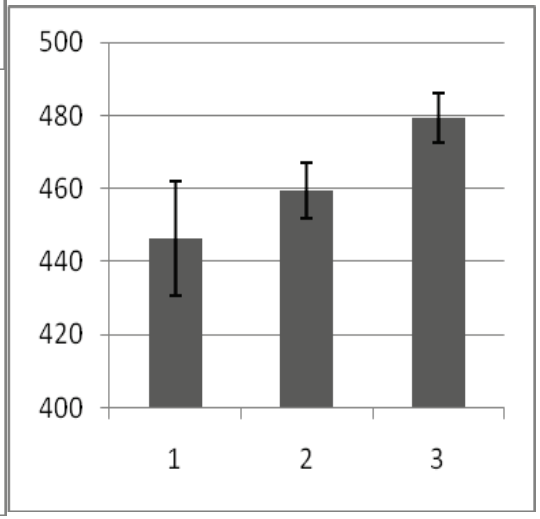

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Assessment of teacher competence

Substantial research output of TEDS-M participants:

Books/country reports Springer (2014), list on IEA website

Special SSCI journal issues JTE (2011), ZfPäd (2012), ZDM (2012, 2015), IJSME (2013, 2105)

Symposia at conferences AERA 2011; EARLI 2011, 2013; ICME 2012; PME 2012, 2014

PhD degrees and promotions to professorships

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Challenges of the first study in HE

Summary #2:

TEDS-M was a serious research enterprise and a great success.

Both OTL *and* selectivity are relevant for teacher education outcomes.

If a broad range of outcomes is considered, OTL in math, math pedagogy and practical experiences matter.

SES is much less relevant than at the school level (threshold effect?).

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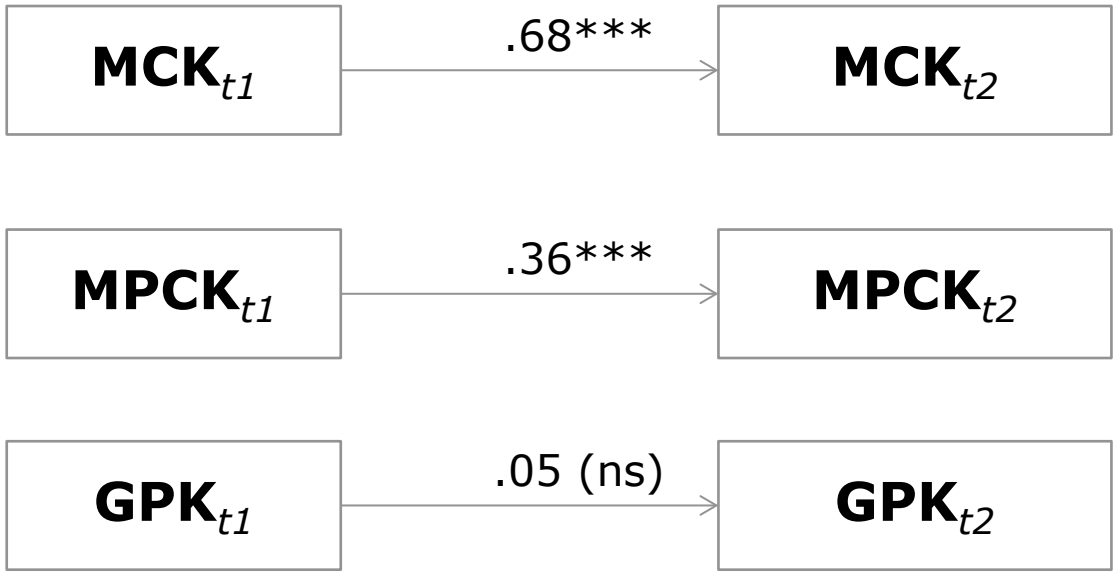
TEDS-M triggered follow-up studies



End of teacher education (TEDS-M)

4 years later

(Blömeke et al., 2014; König et al., 2014)

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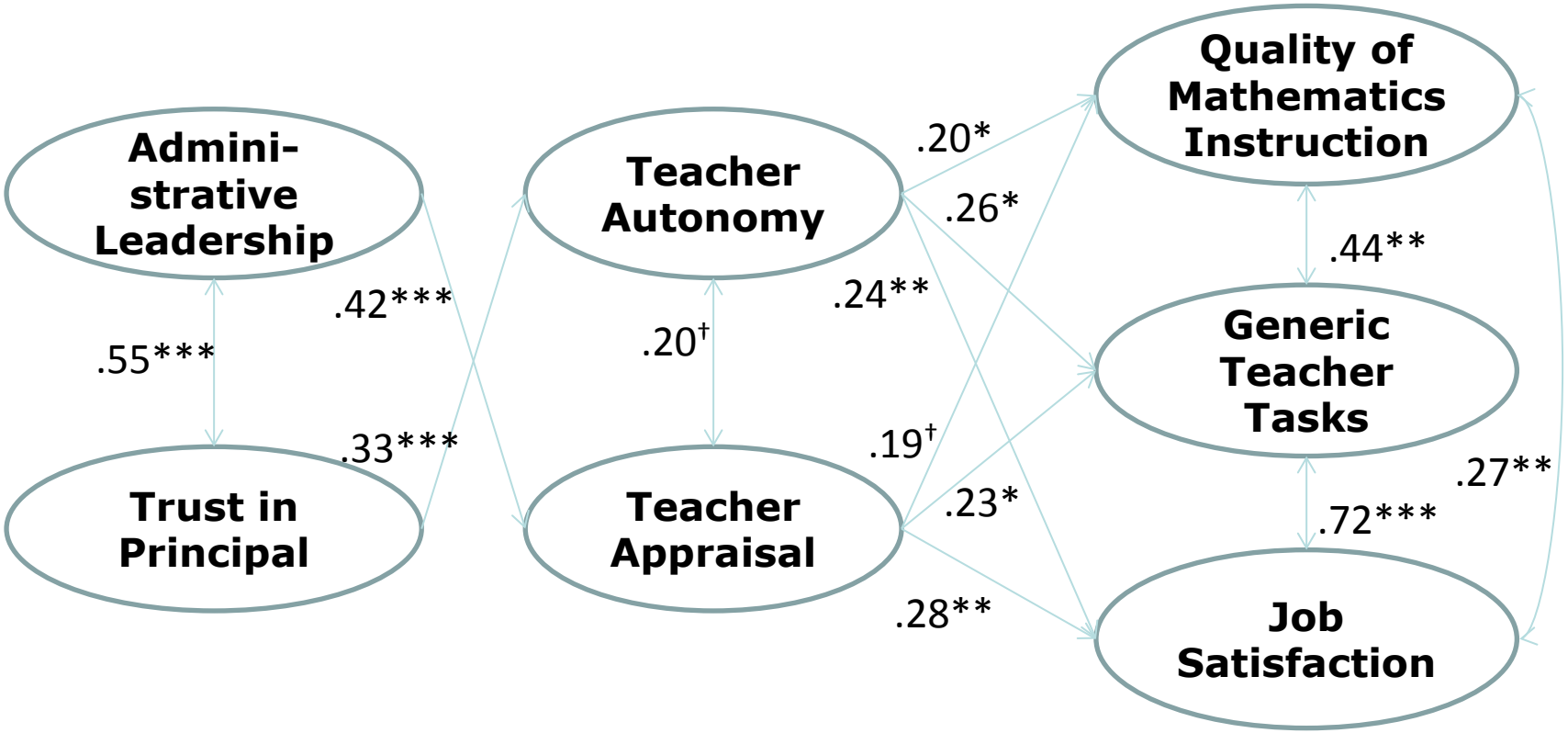

(Blömeke & Klein, 2013)

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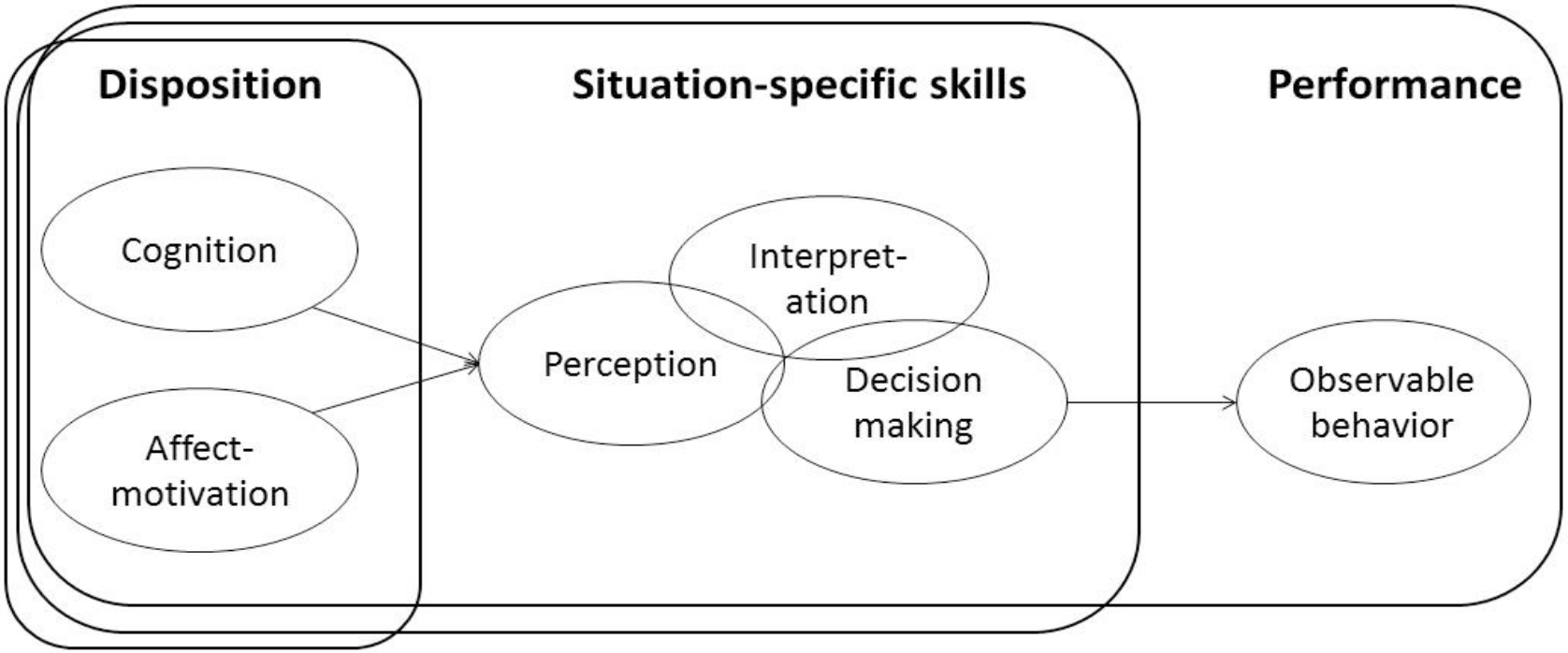

(Blömeke, Gustafsson & Shavelson, in press)

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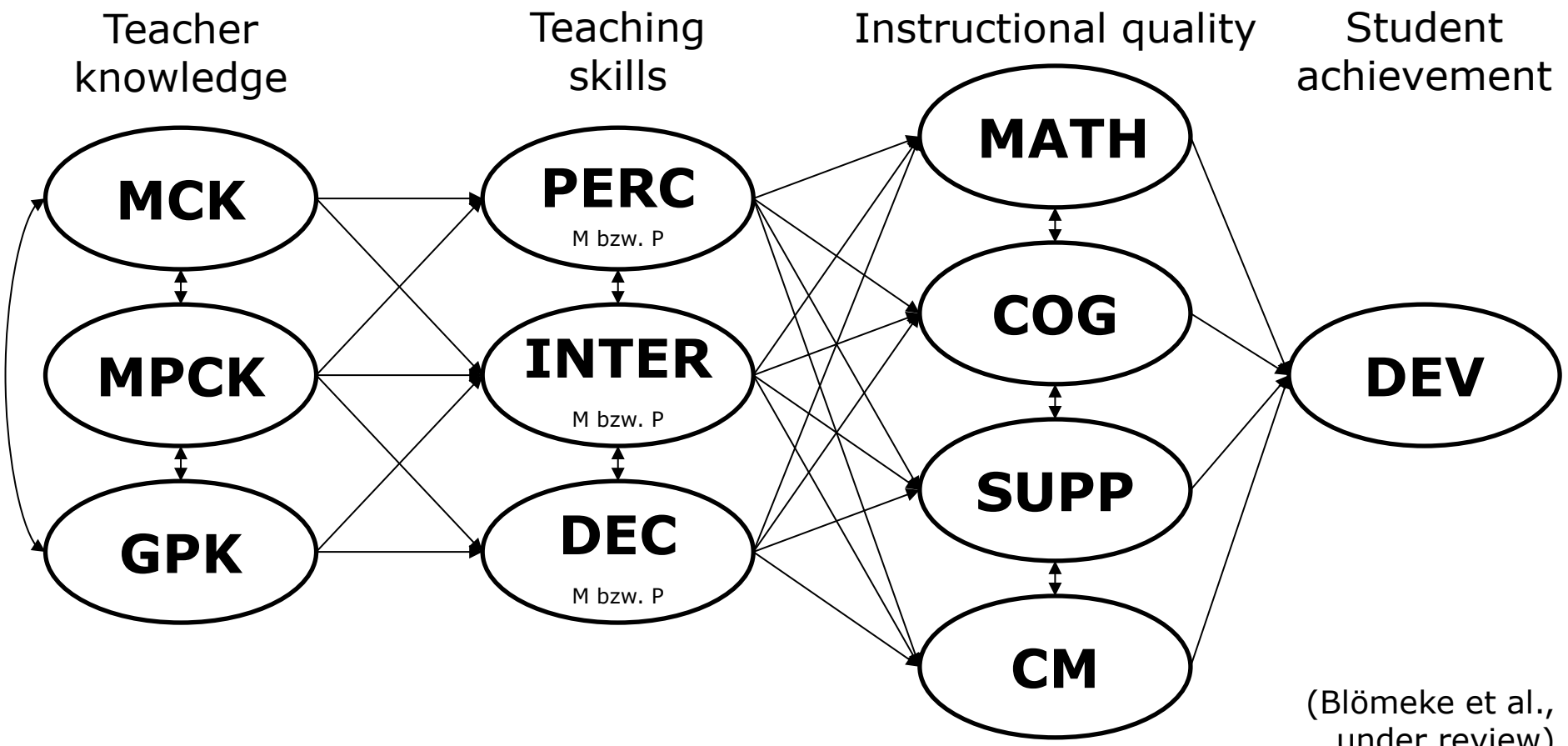
TEDS-M triggered follow-up studies



(Blömeke et al., under review)

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TEDS-M triggered follow-up studies

Summary #3:

Nationally and internationally a boost of follow-up studies were triggered (incl. longitudinal studies and video-based performance assessments).

Teacher education effectiveness and school/teacher/teaching effectiveness re-align and provide a much more sophisticated view on predictors and context conditions of student achievement than prior to TEDS-M.

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Thank you very much for your attention!

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