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Max-Planck-Institut für Bildungsforschung
Max Planck Institute for Human Development

Teachers' General Pedagogical/Psychological Knowledge: Conceptualization and Test Construction

Prof. Dr. Thamar Voss
(Center for Educational Science and Psychology, University of Tübingen)

Symposium "Teachers as Learning Specialists – Implications for Teachers' Pedagogical Knowledge and Professionalism",
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Teachers' General Pedagogical/Psychological Knowledge (PPK)

- Shulman's taxonomy (1986, 1987): content knowledge (CK), pedagogical content knowledge (PCK), general pedagogical knowledge (PK)

- prior research:
  - research on teacher knowledge: content knowledge and pedagogical content knowledge (e.g., Baumert et al., 2010; Krauss et al., 2008; Ball, Hill, & Bass, 2005; Corvacho del Toro & Günther, 2013; Hill, Schilling, & Ball, 2004; Lange et al., 2012; Riese & Reinhold, 2012)
  - recently also more interest in general pedagogical knowledge (e.g., König & Blömeke, 2009; Kunina-Habenicht et al., 2013; Seifert et al., 2009)

→ however: lack of research in many areas of teachers' professional knowledge (especially international research on general pedagogical knowledge)

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Research Goals

1. Developing a theoretical framework

2. Constructing measurement instruments

3. Conducting a validation study

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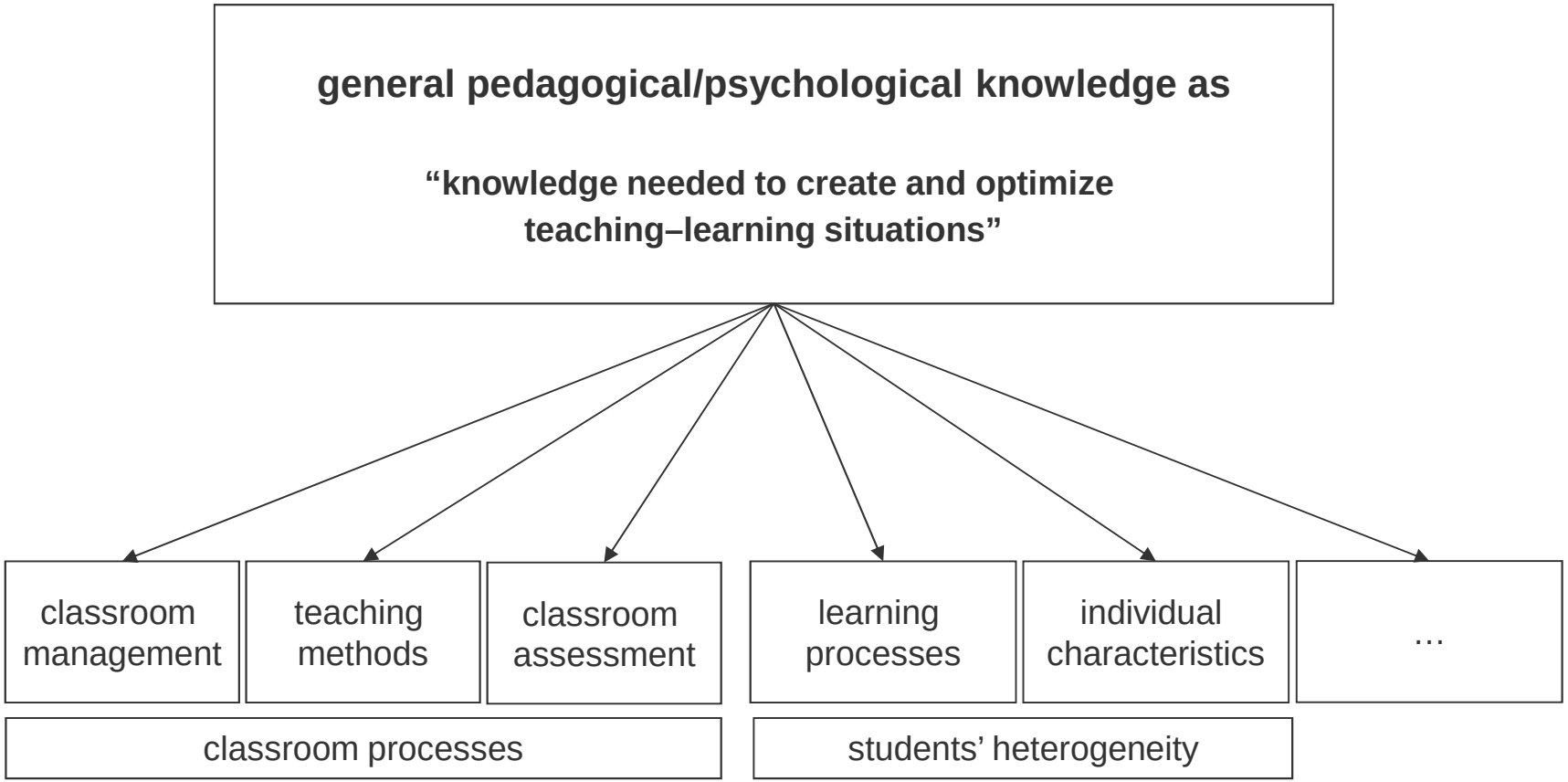
Conceptualization of General Pedagogical/ Psychological Knowledge



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Test Construction

- development of a battery of:
  - multiple-choice items
  - short-answer items
  - videotaped vignettes (classroom management)
- three pilot studies with in-service and pre-service teachers
- coding scheme for the short-answer items
  - evaluate each answer in terms of correctness
  - count the number of conceptually different correct answers per item

→ repertoire of teacher's knowledge

- coders:
  - five students (pedagogy and psychology)
  - three coding training sessions

→ interrater reliability: Cohen's kappa M = .75

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Example Item: Knowledge of Learning Processes

Michael achieves a test score that is below average. You as a teacher want to avoid this result having a negative impact on his self-concept and future learning behavior. What kind of feedback is best suited to achieve this aim?

A) “You didn’t put enough effort into preparing for the test this time. If you work harder, you can make it.”

B) “The test was just too difficult!”

C) “It was just a case of bad luck this time.”

D) “Don’t worry. You are just not good enough to solve these kinds of problems.”

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Example Item: Classroom Management

situation to tap with-it-ness, overlapping:

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Example Item: Classroom Management

- questions to the teachers:

(A) “How do students interfere with instruction? Please describe as precise as possible and in concrete terms all disruptive behaviors you have seen in the video.” → with-it-ness

(B) “You want the girls to stop whispering, but you don’t want to disrupt the lesson. What suggestions do you have? Please list all the strategies you could use to achieve this goal.” → overlapping

- example answers:
  - “Send the girls out.”
  - “Give the girls a warning.”

👎 wrong

  - “Call on the girls.”
  - “Go around and approach the girls.”

👍 right

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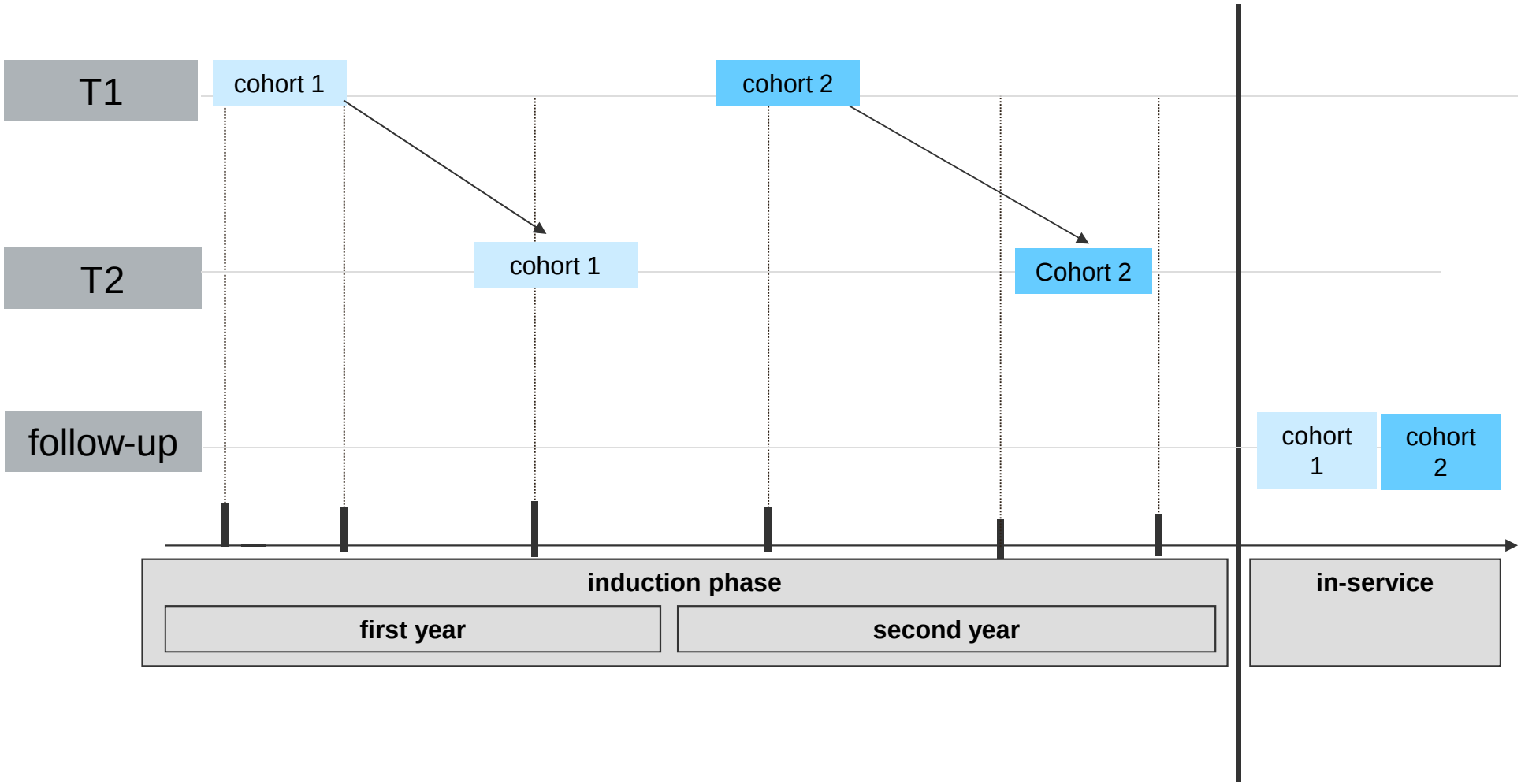
Validation Study with Teacher Candidates

- data base:
  - COACTIV-*Referendariat*: study investigating the acquisition of professional competence in secondary mathematics teacher candidates, conducted at the Max Planck Institute for Human Development, Berlin
- design:
  - main study: two points of measurement during the mandatory German induction phase (*Referendaria*t)
  - follow-up: third point of measurement (former candidates have started regular teaching in school, 14 months of average teaching experience →teacher and student survey on instructional quality)

Study Design



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- sample:
  - main Study: 746 teacher candidates (65% ♀, Age: M = 27.9, SD = 4.4)
  - follow up: 181 teachers and their 7968 students (grade 7 to 10, 69.7 % academic track)

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Sources of Validity

a) internal structure
b) relations to discriminant constructs
c) content (expert ratings)
d) development during the induction phase
e) test–criterion relationships (predictive validity)

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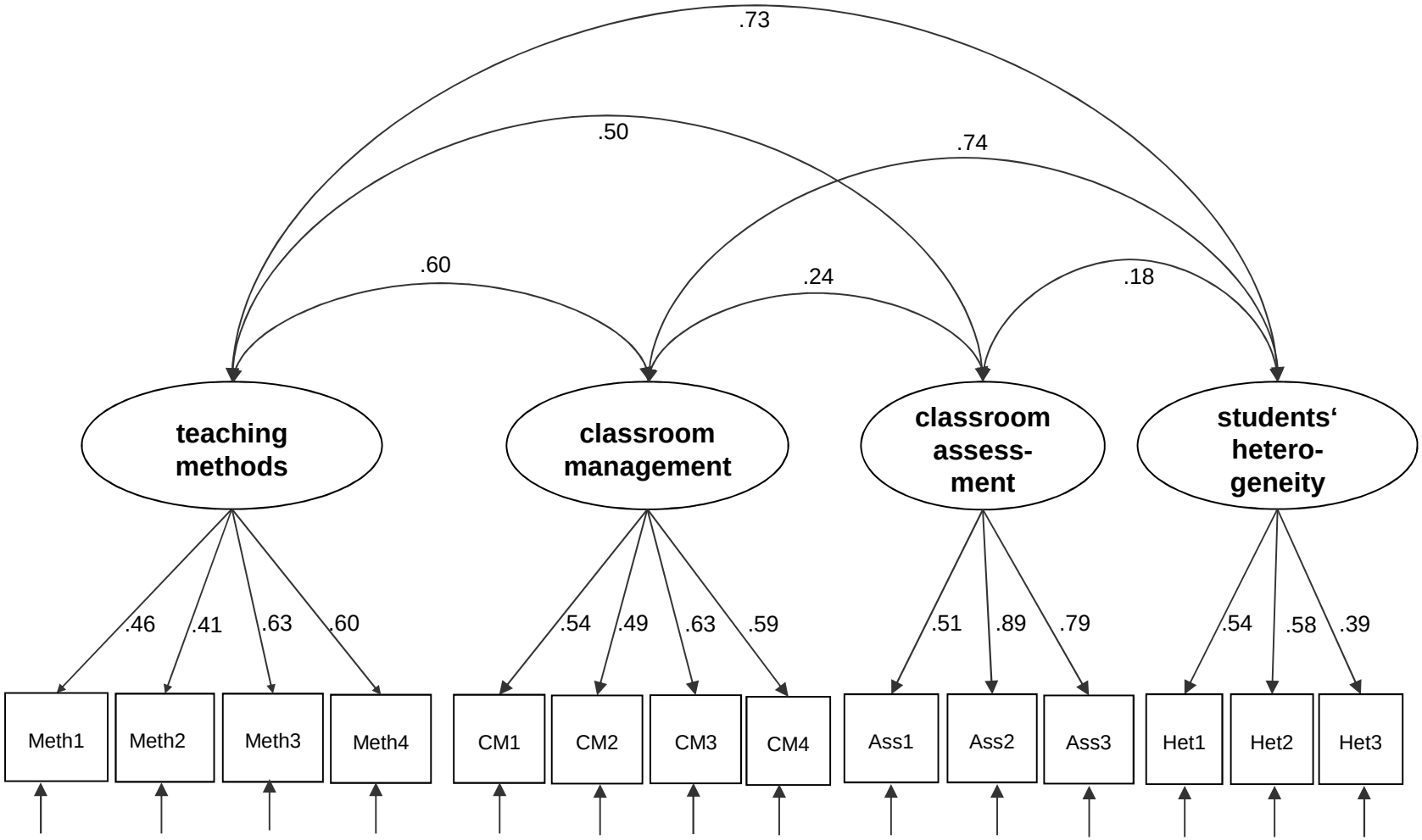
a) Internal Structure



Model fit: $\chi 2$ (71) =196.338, $p < .05$, CFI = . 938, TLI = . 921, RMSEA = . 049, SRMR = . 046

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Descriptive Statistics

	overall PPK	classroom management	teaching methods	classroom assessment	students' heterogeneity
Min	6.00	2.00	0.00	0.00	3.00
Max	99.00	38.00	31.00	16.00	26.00
M	66.58	25.26	17.90	6.82	16.60
SD	13.51	5.08	5.64	4.52	3.83
Cronbach's Alpha	.81	.65	.63	.82	.52

N = 746, PPK: general pedagogical/psychological knowledge

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b) Relations to Discriminant Constructs

	overall PPK	rea-soning	PCK	CK	Tran	Con
overall PPK	-					
reasoning abilities	.58*	-				
Pedagogical Content Knowledge (PCK)	.42*	.69*	-			
Content Knowledge (CK)	.24*	.64*	.91*	-		
Transmissive Beliefs (Tran)	-.16*	-.15*	-.20*	-.11	-	
Constructivist Beliefs (Con)	.01	-.04	.13*	.07	-.67*	-

PPK: general pedagogical/psychological knowledge, PCK = pedagogical content knowledge, CK = content knowledge, Tran = Transmissive beliefs, Con = Constructivist beliefs, N = 746,

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c) Content Validity

- N = 20 experienced in-service teachers as experts for teaching
- analyzed the items in terms of:
  - relevance for teaching
  - domain-generality
  - authenticity of the situations (classroom management)

→ ratings were very encouraging:

- relevance for teaching: M = 5.01
- domain-generality: M = 5.35
- authenticity: M = 5.26

(scale: 1 = *low* to 6 = *high*)

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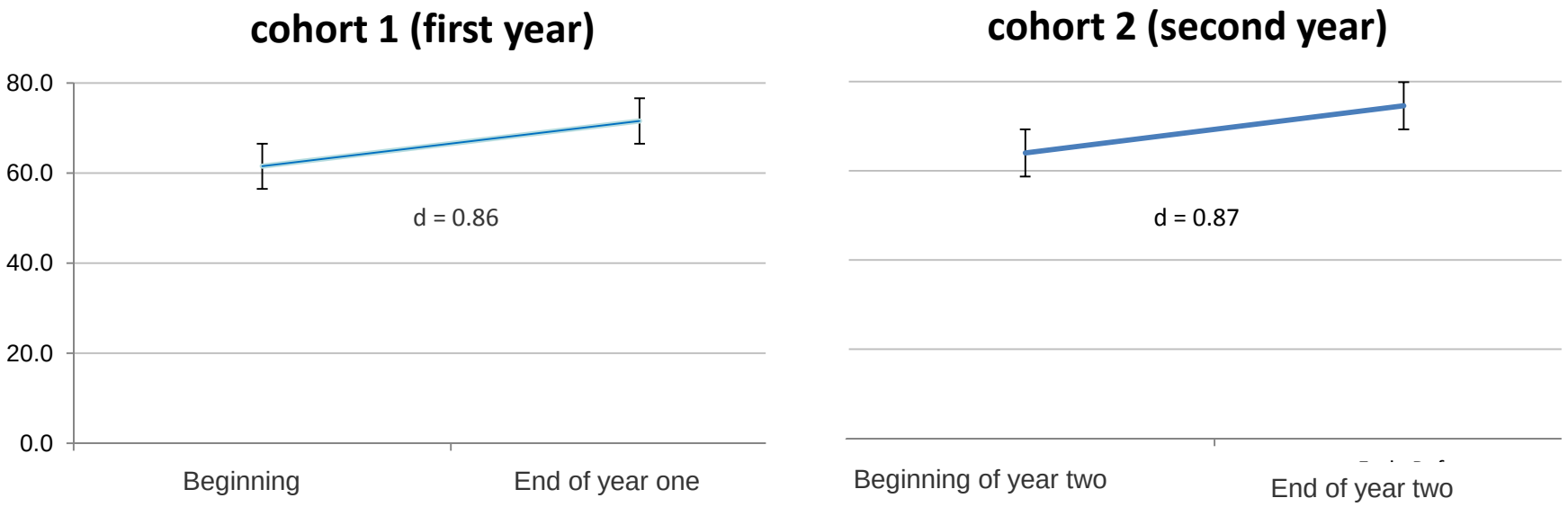
d) Development During the Induction Phase

- large learning gains during the German induction phase
- $d_{overall} = 0.86$



- larger for academic track teachers (d = 0.75 non-academic, d = 1.01 academic)

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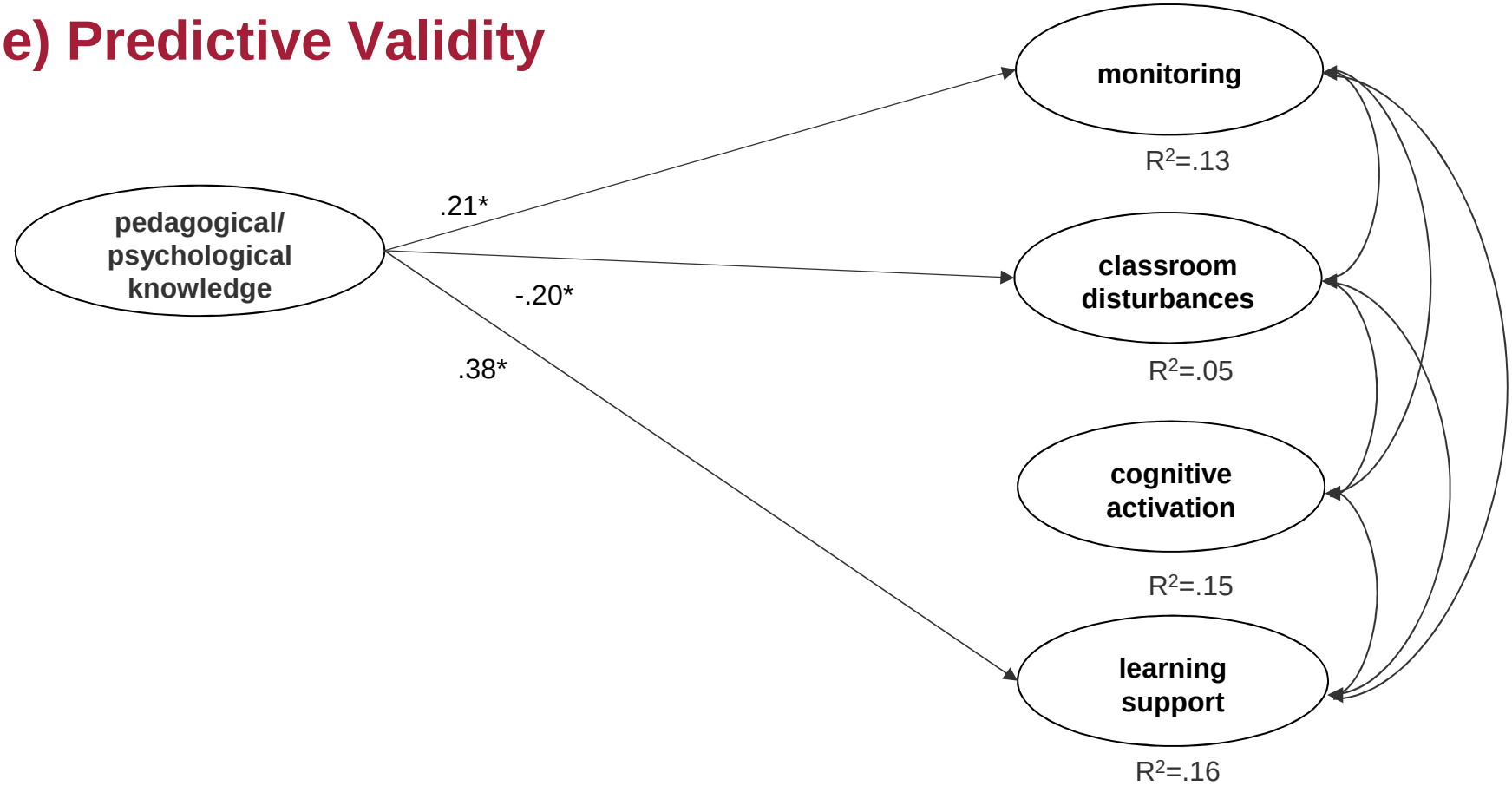
e) Predictive Validity



Induction phase, T1, 2008

Instructional quality from the student perspective, follow-up 2010

Two-level structural equation models; controlled for track (dummy-coded academic versus non-academic track). Model fit: χ^2 (85) =209.363, $p < .05$, CFI = . 985, TLI = . 978, RMSEA = . 014, $SRMR_{within}$ = . 010, $SRMR_{between}$ = . 059

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Conclusions

- this study contributes to opening up a relatively new field for empirical research: teachers' general pedagogical/psychological knowledge
- the new test was designed as a research measure (on the group level, *not* for individual diagnosis) to answer research questions such as:
  - what is the impact of general PPK on teaching and learning?
  - what is the relative importance of subject-specific and generic knowledge?
  - do teachers differ in their PPK?
  - what are the origins of these differences?
  - …

→ discussions of these questions have previously been largely ideological

→ our test of PPK opens this discussion up for empirical verification

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Outlook

- two new projects to improve the measurement and overcome its weaknesses:
  - limited economy
  - assumed generality not tested
  - basis of the conceptualization: secondary mathematics teachers

- aims of the new projects:
  - to broaden the conceptualization (based on different educational contexts [e.g. school teaching, vocational and adult education] and subjects)
  - to empirically test the assumed generality (comparison of teachers from different educational contexts teaching different subjects)
  - to enhance the economy of the measurement
  - to focus more on procedural knowledge
  - …

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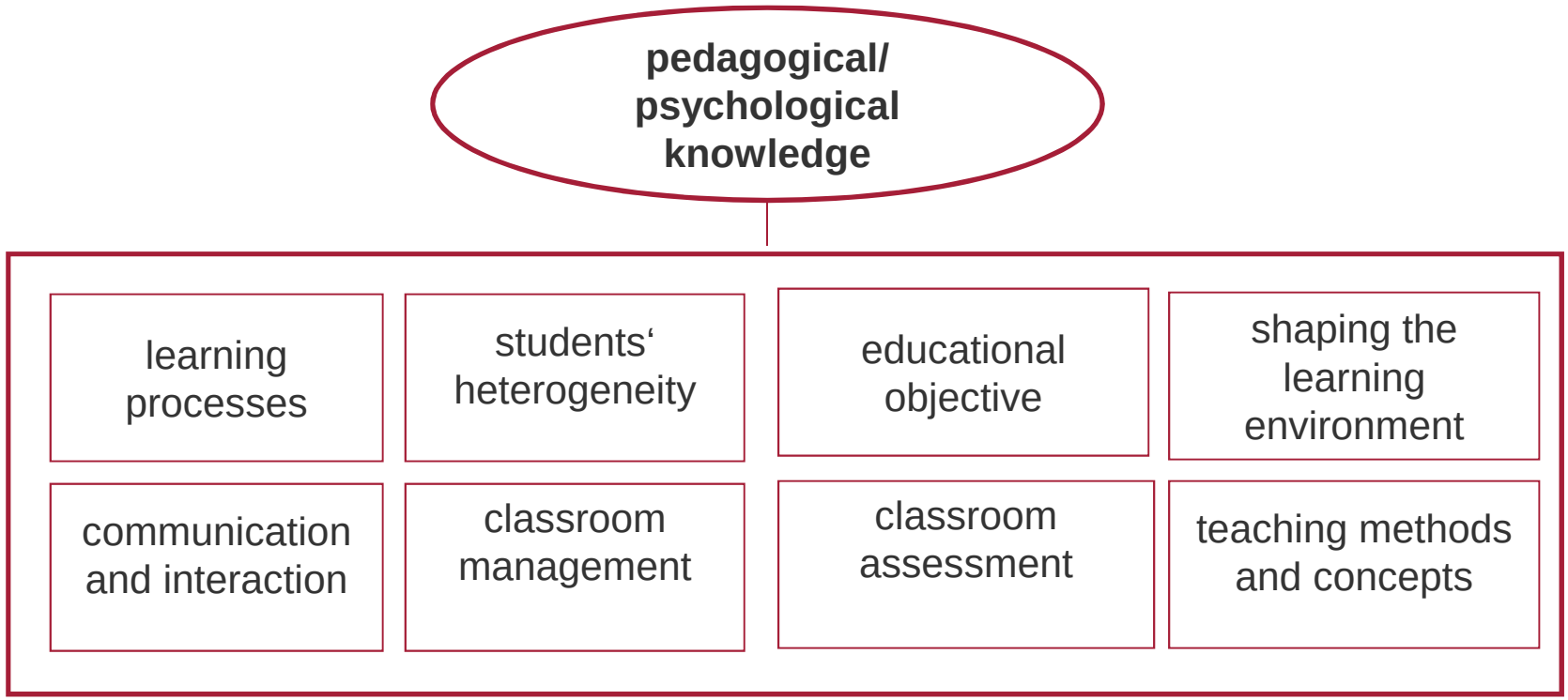
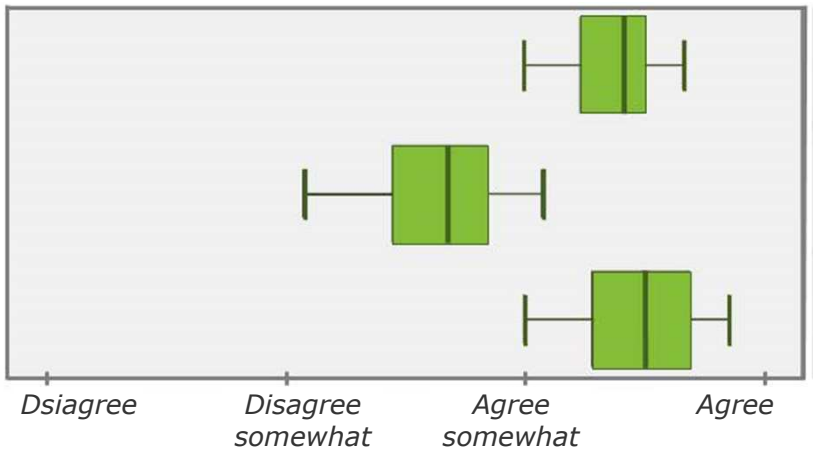
First Results

- broadened conceptualization:
  - based on a broad literature research
  - around 9000 references, inspection of 158 particular relevant references
  - 8 facets with overall 29 sub-facets (sub-facets not depicted)



First Results

- expert rating (N = 44 experts from different educational contexts) on:
  - generality of the (sub-)facets of pedagogical/psychological knowledge
  - relevance for teaching
  - level of knowledge among in-service teachers



Distribution of the means across the 29 sub-facets.

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