Assessing Teachers’ General Pedagogical Knowledge (GPK) as an Outcome of Teacher Education

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University of Cologne, Germany

New perspectives on future teachers’ professional competencies from an international perspective

Congress at the University of Hamburg, 21-23 September 2017
Introduction

Teachers matter

Teacher education matters
Introduction

Teacher Education Reform Debates (Germany)

• qualifying the teaching workforce

• improving initial teacher education (e.g., „Qualitätsoffensive Lehrerbildung“, BMBF, 2014)

• Recurring topics (e.g., theory-practice-gap, entry selection)

• More recent topics (e.g., preparing for inclusive education)

• adding output to input orientation (standards, competencies)

(cf. the overview by Herzmann & König, 2016)

Introduction

Background underlying Teacher Education

significant discourse looks at the teacher quality and the quality of teacher education (OECD, 2005; Hattie, 2009; 2012; Schleicher, 2011)

the underlying assumption is that:

with an increase of teacher quality and quality of teacher education, teachers can provide high quality opportunities to learn at school and thus indirectly contribute to an increase in student achievement
Introduction

Studying teacher competencies as an outcome of teacher education (König, 2018/in press)

Introduction

Empirical Educational Research: Questions

• detailed definition of standards and corresponding assessments
  (e.g., Terhart, 2002; Baumert & Kunter, 2006; Blömeke, 2006; König & Hofmann, 2010; Klemenz & König, submitted)

• Teacher education effectiveness – accounting for different levels
  (systems, institutions, programs, courses)
  (e.g., Schaefer, 2002; Blömeke, 2004; Cochran-Smith & Zeichner, 2005; Terhart, 2012; Cochran-Smith & Villegas, 2016)

• Analyses of influences of teacher competencies on teaching process
  and student outcomes – on different levels
  (e.g., Baumert et al., 2010; König & Kramer, 2016; König & Pflanzl, 2016; Guerriero, 2017)

• Complex analyses of the suggested chain
  Teacher Education – Teacher Competencies – Teaching – Student Learning
  (e.g., Baumert & Kunter, 2006; Guerriero, 2017)
Introduction

Teachers’ professional knowledge

• Broad agreement on the assumption that teacher knowledge is significant for effective teaching and student achievement (Darling-Hammond & Bransford, 2007; Grossman & McDonald, 2008; Munby, Russell, & Martin, 2001; Woolfolk Hoy et al., 2006; Gitomer & Zisk, 2015).

• Teacher expertise research (e.g., Berliner, 2001, 2004)
  • Expert-Novice-Difference
  • Knowledge is relevant for the professional teacher

• Shulman: Differentiation of teacher knowledge categories
  Content Knowledge – Pedagogical Content Knowledge – General Pedagogical Knowledge
Introduction

Teachers‘ professional knowledge

• Content Knowledge (CK)
  • the knowledge of the specific subject
  • related to the content teachers are required to teach
  • shaped by academic disciplines underlying the subject (Freeman, 2002)
  • For example, TEDS-M content areas of MCK: number, geometry, algebra, and data (Tatto et al., 2008, p. 36).

• Pedagogical Content Knowledge (PCK)
  • includes subject-specific knowledge for the purpose of teaching
  • Research area, large number of studies
  • Reviews suggest at least two facets (Van Driel et al., 1998; Park & Oliver, 2008; Bukova-Güzel, 2010):
    • knowledge of subject-specific instructional strategies (including representations, explanations)
    • Knowledge of learners (including misconceptions)
Introduction

Teachers‘ professional knowledge

• General Pedagogical Knowledge (GPK)
  • not subject-matter related

  • “broad principles and strategies of classroom management and organization that appear to transcend subject matter” (Shulman, 1987, p. 8)

  • “knowledge of theories of learning and general principles of instruction, an understanding of the various philosophies of education, general knowledge about learners, and knowledge of the principles and techniques of classroom management” (Grossman & Richert, 1988, p. 54).
Introduction

Teachers‘ professional knowledge as part of teachers competencies

Model of teachers‘ professional competencies
(cf. Baumert et al., 2010; Tato et al., 2012)

cognitive domains
• content knowledge (CK)
• pedagogical content knowledge (PCK)
• general pedagogical knowledge (GPK)

motivational-affective variables
(e.g. self-efficacy, beliefs, teaching motivation)
Introduction

Teachers‘ professional knowledge as part of teachers competencies

(Blömeke et al. 2015)
This Presentation

- What conceptual frameworks have been used to consider GPK of teachers in empirical educational research?

- How can GPK be assessed?

- What do the empirical findings show regarding GPK as an outcome of teacher education?

- What could be recommended for future research?
Content

1. Introduction
2. Review of Empirical Studies on GPK
3. Examples of Assessments
4. Discussion and Perspectives
Content

1. Introduction

2. Review of Empirical Studies on GPK

3. Examples of Assessments

4. Discussion and Perspectives
Concepts of GPK – findings from a systematic review by König (2014)

Systematic Review of Empirical Research on GPK

• Conducted in 2013 (published 2014)


Available at the OECD website: http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=EDUCERI/CD/RD%282014%29/REV1&doclanguage=en

• More information on the OECD Survey

Concepts of GPK – findings from a systematic review by König (2014)

- Selection criteria:
  - Term search in databases (Eric, Psychinfo, Web of Science)
  - published in peer-reviewed journals
  - from 1998 to 2013
  - written in English
  - explicit focus on GPK (not PCK)
  - only empirical articles (quantitative/qualitative)
  - 69 results, only 6 studies left
  - adding other studies not found in the database

- Key findings:
  - Small number of studies
  - Unexpected high agreement on the content of GPK
  - Virtually no study examining the link to instructional quality
  - Studies from the German-speaking context are dominating
  - Paper-pencil knowledge tests predominate
  - Innovative Assessments Formats can be identified
Concepts of GPK – findings from a systematic review by König (2014)

• Which studies were looked at? – Five groups of studies:

1. Studies Using Paper-Pencil-Tests to Measure GPK Extensively (8 publications)

2. Studies Using Paper-Pencil-Tests to Measure a Small Segment of GPK (2 publications)

3. Studies Using Videobased Stimulus for Testing Knowledge and/or Skills (5 publications)

4. Studies Rating the Demonstration of Teaching Skills (without rating the performance in class) (2 publications)

5. Phenomenological Studies Describing Teacher Knowledge (7 publications)
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2. Review of Empirical Studies on GPK

3. Examples of Assessments
   3.1 Paper-Pencil-Measures
   3.2 Videobased Stimulus
   3.3 Demonstration of Teaching Skills

4. Perspectives
### Concepts of GPK – findings from a systematic review by König (2014)

#### Content dimensions of GPK: Overview of studies

<table>
<thead>
<tr>
<th>Topics and areas covered in paper-and-pencil-tests measuring GPK extensively</th>
<th>TEDS-M</th>
<th>LEK</th>
<th>BILWISS</th>
<th>COACTIV-R</th>
<th>PLT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TEACHING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>structure</td>
<td></td>
<td></td>
<td>didactics</td>
<td>teaching methods</td>
<td>instructional process</td>
</tr>
<tr>
<td>classroom management</td>
<td></td>
<td></td>
<td>classroom management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>motivation</td>
<td></td>
<td></td>
<td>learning/development</td>
<td>students' heterogeneity (student characteristics, students’ learning process)</td>
<td>students as learners</td>
</tr>
<tr>
<td>adaptivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>assessment</td>
<td></td>
<td></td>
<td>diagnosis/evaluation</td>
<td></td>
<td>assessment</td>
</tr>
<tr>
<td><strong>NON-TEACHING TASKS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>school improvement</td>
<td></td>
<td></td>
<td>school pedagogy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>nurturing and educating students</td>
<td></td>
<td></td>
<td>educational theory</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PLT – Principles of Learning and Teaching
TEDS-M: GPK as an international construct (König et al., 2011)


http://journals.sagepub.com/doi/abs/10.1177/0022487110388664

**Teacher Education and Development Study – Learning to Teach Mathematics (TEDS-M 2008)**

(Tatto et al., 2012; Blömeke et al., 2014)

- led by the *International Association for the Evaluation of Educational Achievement* (IEA)
- international study of teacher education, large-scale assessment
- 17 countries participating
- target population: future teachers of mathematics (primary and lower secondary level) in their last year of teacher education
- measuring the professional knowledge of future teachers: content knowledge, pedagogical content knowledge

**National option: Measuring the GPK**

- development of a test component under the leadership of the German TEDS-M team
- participating countries: Germany, Taiwan and the US
# TEDS-M: GPK Test Instrument

Test dimensionality and test item content

<table>
<thead>
<tr>
<th>test dimensionality</th>
<th>topics covered by the test items</th>
</tr>
</thead>
</table>
| structure               | - components of lesson planning and lesson process  
                          - lesson evaluation  
                          - structuring of learning goals  |
| motivation/classroom management | - achievement motivation  
                                   - strategies to motivate single students / the whole group  
                                   - strategies to prevent and counteract interferences  
                                   - effective use of allocated time / routines  |
| adaptivity              | - strategies of differentiation  
                          - variety and use of teaching methods  |
| assessment              | - assessment types and functions  
                          - central criteria  
                          - teacher expectation effects  |

(see König et al., 2011 for details)
**TEDS-M: GPK Test Instrument**

Test design matrix

**Content dimensions and cognitive processes**

<table>
<thead>
<tr>
<th>content dimensions</th>
<th>cognitive processes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>recall</td>
</tr>
<tr>
<td></td>
<td>understand/analyze</td>
</tr>
<tr>
<td></td>
<td>Generate/create</td>
</tr>
<tr>
<td>structure</td>
<td></td>
</tr>
<tr>
<td>motivation/management</td>
<td></td>
</tr>
<tr>
<td>adaptivity</td>
<td></td>
</tr>
<tr>
<td>assessment</td>
<td></td>
</tr>
</tbody>
</table>

(see König et al., 2011 for details)
Which of the following cases represents an example of intrinsic motivation, and which represents an example of extrinsic motivation?

<table>
<thead>
<tr>
<th>Item example 1: motivation / understand/analyze</th>
</tr>
</thead>
<tbody>
<tr>
<td>A student learns before a test in mathematics, because he/she...</td>
</tr>
<tr>
<td>A. expects a reward for a good grade.</td>
</tr>
<tr>
<td>B. wants to avoid the consequences of a bad grade.</td>
</tr>
<tr>
<td>C. is interested in problems of mathematics.</td>
</tr>
<tr>
<td>D. does not want to disappoint his/her parents.</td>
</tr>
<tr>
<td>E. wants to maintain his/her relative rank in the class.</td>
</tr>
</tbody>
</table>

**Solution:** intrinsic motivation – C  
extrinsic motivation – A, B, D, E
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) 

2) 

3) 

... 

10) 

Criteria: context – input – process – outcome
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?*

**Criteria:** context – input – process – outcome
TEDS-M: International comparisons

International assessment validated through expert reviews and confirmatory approaches in TEDS-M, comparative analysis with pre-service teachers from the US, Taiwan, and Germany (cf. König et al., 2011; König & Blömeke, 2012)

Table 8. Overall General Pedagogical Knowledge Test Score

<table>
<thead>
<tr>
<th>Country</th>
<th>M</th>
<th>SE</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>576</td>
<td>4.9</td>
<td>85</td>
</tr>
<tr>
<td>Taiwan</td>
<td>572</td>
<td>3.2</td>
<td>52</td>
</tr>
<tr>
<td>International</td>
<td>500</td>
<td>2.2</td>
<td>100</td>
</tr>
<tr>
<td>United States</td>
<td>440</td>
<td>3.0</td>
<td>66</td>
</tr>
</tbody>
</table>


http://journals.sagepub.com/doi/abs/10.1177/0022487110388664
Analysis of GPK as an Outcome of Teacher Education

How do teachers acquire their GPK?

Initial Teacher Education
- First phase (University)
- Second phase (Induction)

In-Service Teaching

LEK t1
LEK t2
TEDS-M

Studies Using **Paper-Pencil-Tests** to Measure GPK Extensively
Acquisition of pre-service teachers’ GPK

Pre-service teachers at the end of training outperform pre-service teachers just entering training


http://dx.doi.org/10.1007/s10763-013-9420-1

<table>
<thead>
<tr>
<th>Overall general pedagogical knowledge test score</th>
<th>M</th>
<th>SE</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start of training (LEK)</td>
<td>372</td>
<td>7.6</td>
<td>130</td>
</tr>
<tr>
<td>After two years training (LEK)</td>
<td>525</td>
<td>7.1</td>
<td>98</td>
</tr>
<tr>
<td>End of training (TEDS-M)</td>
<td>613</td>
<td>5.3</td>
<td>84</td>
</tr>
</tbody>
</table>

*TEDS-M Teacher Education and Development Study in Mathematics, LEK Longitudinal Survey of Student Teachers’ Pedagogical Competencies*
Recall

Understand/
analyze

Generate

<table>
<thead>
<tr>
<th></th>
<th>Start vs. After two years</th>
<th>After two years vs. End</th>
</tr>
</thead>
<tbody>
<tr>
<td>$d$</td>
<td>Recall</td>
<td>Understand/analyze</td>
</tr>
<tr>
<td>Start vs. After two years</td>
<td>1.21</td>
<td>1.33</td>
</tr>
<tr>
<td>After two years vs. End</td>
<td>1.44</td>
<td>0.37</td>
</tr>
</tbody>
</table>

Pre-service teachers at the end of training outperform pre-service teachers just entering training (König, 2013)

Studies Using **Paper-Pencil-Tests** to Measure GPK Extensively
Development of GPK after teacher preparation

How do in-service teachers work on their GPK?

Initiatial Teacher Education
First phase (University)
Second phase (Induction)

In-Service Teaching

TEDS-M TEDS-Follow Up

Studies Using Paper-Pencil-Tests to Measure GPK Extensively
TEDS-Follow Up: Transition from Training to Teaching

Increase of teachers’ GPK after 4 years


[http://dx.doi.org/10.1016/j.tate.2013.11.004](http://dx.doi.org/10.1016/j.tate.2013.11.004)
Teachers‘ GPK effects on their teaching


http://dx.doi.org/10.1080/02619768.2016.1214128

**Does teachers‘ GPK matter for their teaching?**

- In-service teachers‘ GPK was assessed (n = 246 in Austria)
- Their students were asked to rate the instructional quality delivered by their teachers

<table>
<thead>
<tr>
<th>Scale</th>
<th>Item-Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>teacher-student relationships</td>
<td>The teacher listens to the students carefully.</td>
</tr>
<tr>
<td>generic teaching methods/teacher clarity</td>
<td>The teacher divides the lesson into sections that fit with each other.</td>
</tr>
<tr>
<td>effective classroom management</td>
<td>The teacher permanently controls how students work.</td>
</tr>
</tbody>
</table>
Teachers‘ GPK effects on their teaching


[http://dx.doi.org/10.1080/02619768.2016.1214128](http://dx.doi.org/10.1080/02619768.2016.1214128)

Does teachers‘ GPK matter for their teaching?

<table>
<thead>
<tr>
<th>Teachers (Testscores)</th>
<th>Students (Ratings)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Pedagogical Knowledge</strong></td>
<td><strong>Teacher-student relationships</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Teaching methods/Clarity</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Classroom management</strong></td>
</tr>
</tbody>
</table>

Control variables (n.s.):
- Big-Five
- Teaching experience (in months)
- Teacher education grades

* p ≤ .05
Content

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2. Review of Empirical Studies on GPK

3. Examples of Assessments
   3.1 Paper-Pencil-Measures
   3.2 Videobased Stimulus
   3.3 Demonstration of Teaching Skills

4. Perspectives
Classifying facets of teacher knowledge - opportunities and limits of paper-pencil instruments

Types and forms of professional teacher knowledge (following Baumert & Kunter, 2006; Fenstermacher, 1994; Hackl, 2004; Bromme, 1992; 1997)

- **theoretical-formal knowledge**
  - can be tested via paper-pencil

- **practical knowledge and performance**
  - explicable
    - perception and analysis of performance in the classroom
    - lesson planning, options how to perform
  - obvious only when experts perform in the classroom

*Studies Using Videobased Stimulus for Testing Knowledge and/or Skills*
Video-based assessment of teacher knowledge

Increase of research on teacher knowledge using video-based assessment

Research on teacher expertise (expert-novice-comparisons)

- experts organize, structure, access their knowledge differently from novices
  (e.g., Bromme, 1992; Bransford, Brown & Cocking, 2000).

Abilities of perception and interpretation
  (e.g., Sabers, Cushing & Berliner, 1991)

- experts’ interpretation of classroom situation events are more coherent, more rich compared with novices;

- experts recognize key elements, are able to develop alternative options when decision making
CME – Classroom Management Expertise

Classroom Management

• core challenge for teachers (u.a. Hattie, 2009; Helmke, 2009)

• based on teacher knowledge („intellectual framework“) (u.a. Doyle, 1985; 2006; Evertson & Weinstein, 2006).

• part of GPK definitions


http://dx.doi.org/10.1007/s11858-015-0705-4

(see König & Lebens, 2012; König 2015; König & Kramer, 2016, for details)
CME – Classroom Management Expertise

Content dimensions and cognitive processes

<table>
<thead>
<tr>
<th>classroom management situations</th>
<th>cognitive processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transitions</td>
<td>accuracy of perception</td>
</tr>
<tr>
<td>Instructional time</td>
<td></td>
</tr>
<tr>
<td>Student behavior</td>
<td></td>
</tr>
<tr>
<td>Instructional feedback</td>
<td></td>
</tr>
</tbody>
</table>

(see König & Lebens, 2012; König 2015; König & Kramer, 2016, for details)
CME
Example Video Clip used as Item Prompt

- students work in groups
- end of group work phase
- teacher signals transition
- teacher gains students‘ attention
- teacher instructs students
- start of presentation phase

length: 81 Sec.
topic „Suicide“, ethics
www.guterunterricht.de
managing transition
CME – Classroom Management Expertise
Item-Examples

1) Please name four different techniques employed by the teacher to gain her students‘ attention.

2) When does the situation displayed in the video take place? Please tick only one box
   A. At the beginning of the lesson (i.e., during the first 5 minutes).
   B. During the first third of the lesson.
   C. During the last third of the lesson.
   D. At the end of the lesson (i.e., during the final 5 minutes).

3) Which function does the seating arrangement of students have for the lesson shown?
Sample

Contrasted groups, total sample size n = 188

<table>
<thead>
<tr>
<th>Teacher group</th>
<th>(1) Pre-service, third year „novices“</th>
<th>(2) Pre-service, Induction phase „advanced beginners“</th>
<th>(3) In-service, M = 18 years teaching exp. „experienced“</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>114</td>
<td>40</td>
<td>34</td>
</tr>
<tr>
<td>Age (Mean)</td>
<td>23</td>
<td>28</td>
<td>43</td>
</tr>
<tr>
<td>Female (%)</td>
<td>79 %</td>
<td>75 %</td>
<td>91%</td>
</tr>
</tbody>
</table>

For further details see König & Kramer (2016)
Descriptives

CME Scores by teacher expertise group

Means of test scores for the three expertise groups

Classroom Management Expertise (CME)
Instructional Quality Measures

Student rating scales, derived from the literature
(e.g., PISA, see Ramm et al., 2006)

<table>
<thead>
<tr>
<th>Scale</th>
<th>Items</th>
<th>Item-Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Withitness</td>
<td>4</td>
<td>Our teacher always knows exactly what happens in the classroom.</td>
</tr>
<tr>
<td>Clarity of rules</td>
<td>3</td>
<td>In the lesson it is clear what students are allowed to do and what they are not allowed to do.</td>
</tr>
<tr>
<td>Clarity of teacher explanation</td>
<td>3</td>
<td>Our teacher explains things step by step.</td>
</tr>
<tr>
<td>Support</td>
<td>4</td>
<td>The teacher additionally supports us when we need help.</td>
</tr>
</tbody>
</table>

Likert-scales, 4 categories (from 'not true' to 'true')

CFA (student level): $\chi^2 / df = 2.11$, RMSEA = .05, SRMR = .04
CME predicting instructional quality

Empirical findings from multi-level modelling (n = 21 teachers)

<table>
<thead>
<tr>
<th></th>
<th>Withitness</th>
<th>Clarity of Rules</th>
<th>Clarity of Teacher explanations</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>CME</td>
<td>β</td>
<td>β</td>
<td>β</td>
<td>β</td>
</tr>
<tr>
<td>R-square</td>
<td>.47**</td>
<td>.36*</td>
<td>.20</td>
<td>.22</td>
</tr>
<tr>
<td>(between)</td>
<td>.22</td>
<td>.13</td>
<td>.05</td>
<td>.05</td>
</tr>
</tbody>
</table>

*** p ≤ .001  ** p ≤ .01  * p ≤ .05  # p ≤ .10

Studies Using Videobased Stimulus for Testing Knowledge and/or Skills
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3. Examples of Assessments
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   3.3 Demonstration of Teaching Skills

4. Discussion

5. Perspectives
Classifying facets of teacher knowledge
- opportunities and limits of paper-pencil instruments

Types and forms of professional teacher knowledge
(following Baumert & Kunter, 2006; Fenstermacher, 1994; Hackl, 2004; Bromme, 1992; 1997)

- theoretical-formal knowledge
  - can be tested via paper-pencil
  - can be tested via paper-pencil to a limited extend

- practical knowledge and performance
  - explicable
    - perception and analysis of performance in the classroom
    - lesson planning, options how to perform
  - obvious only when experts perform in the classroom
  - Can be tested via paper-pencil
Lesson Planning

- a crucial challenge for teachers
  (e.g., Baumert & Kunter, 2006; KMK, 2004)

- a problem-solving process
  (e.g., Yinger, 1977; Bromme, 1981)

- relies on specific knowledge in the subject area, subject-specific pedagogy, and general pedagogy
  (following Blömeke, Gustafsson & Shavelson, 2015)

- subject of teacher preparation
  (e.g., KMK, 2004; Plöger, 2008)

Studies Rating the Demonstration of Teaching Skills
Investigation into the Field

- very limited empirical evidence on how (pre-service) teachers plan their lessons

- research on measuring and modelling lesson planning as a teaching skill does not exist at all
  (e.g., Aufschnaiter, & Blömeke, 2010)

- first approach provided by the project „Planungskompetenz von Lehrerinnen und Lehrern“ (PlanvoLL): analyzing written plans of demonstration lessons (“Lehrproben”) in a standardized way
  (König, Buchholtz, & Dohmen, 2015)


http://dx.doi.org/10.1007/s11618-015-0625-7
Approach Provided by the PlanvoLL Study

- focussing pedagogical adaptivity („didaktische Adaptivität“) as a core task of lesson planning

- following expertise research, typical problems occurring during the process of lesson planning are inextricably linked to the specific situation, in particular to the characteristics of the learning group as perceived by the planning teacher

- written lesson plans are analysed, indicators created

- reconstructing and modelling how the pre-service teachers relate their knowledge to their real learning group

(see for details, Buchholtz, König & Dohmen, 2015)
## PlanvoLL: Analysis Categories

<table>
<thead>
<tr>
<th>1</th>
<th>Description of situation-specific factors</th>
<th>3</th>
<th>Applying descriptions to the specific situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>The teacher describes the learning group.</td>
<td>30</td>
<td>The teacher describes the specific cognitive level of students (whole learning group) towards the learning task following the „zone of proximal development“.</td>
</tr>
<tr>
<td>11</td>
<td>The teacher describes interindividual differences in cognitive preconditions of the learning group.</td>
<td>31</td>
<td>The teacher describes the specific cognitive levels of students (student differentiation) towards the learning tasks following the „zone of proximal development“.</td>
</tr>
<tr>
<td>12</td>
<td>The teacher describes interindividual differences in motivational preconditions of the learning group.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2</th>
<th>Description of the learning task</th>
<th>4</th>
<th>Connecting elements of planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>The teacher describes the learning task.</td>
<td>40</td>
<td>Learning task(s) and lesson objective(s) is/are connected.</td>
</tr>
<tr>
<td>21</td>
<td>The learning task explicitly comprises different cognitive levels (explicit instruction of student differentiation).</td>
<td>41</td>
<td>Grouping students is connected with student and task(s) differentiation.</td>
</tr>
<tr>
<td>22</td>
<td>The differentiation of learning tasks outlined under 21 is supported with reasons.</td>
<td>42</td>
<td>Check of results required by learning task(s).</td>
</tr>
</tbody>
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**Studies Rating the Demonstration of Teaching Skills**
# PlanvoLL: Analysis Categories

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| 20 | The teacher describes the learning task. |
| 21 | The learning task explicitly comprises different cognitive levels (e.g., of student differentiation). |
| 22 | The differentiation of learning tasks outlined under 21 is supported with reasons. | Check of results required by learning task(s). |
PlanvoLL: Findings

- n = 106 teacher candidates during internship/2nd phase (federal state of Berlin)
- T1: start of internship, T2: end of internship/2nd phase
- coding of written plans by two independent raters (Kappa = .83), using coding rubrics
- 11 items, IRT-scaling, EAP-Reliability .703

(see for details, Buchholtz, König & Dohmen, 2015)
PlanvoLL: Analysis Categories

- significant increase ($p < .05$) in six categories from t1 to t2

11 interindividual differences

21 differentiation of task

30 cognitive level to task (group)

31 cognitive level to task (differentiated)

40 connecting task(s) and objective(s)

41 connecting grouping students and task(s)

(see for details, Buchholtz, König & Dohmen, 2015)
PlanvoLL: Findings

- **Curricular validity**
  - Significant increase in the total score during internship ($d = .8$)
  - Categories confirmed by teacher educators (expert rating)

- **Discriminant validity (correlations)**
  - Beliefs about teaching and learning ($t1/t2$)
    - Transmissive approach: $-.07 / -.22^*$
    - Constructive approach: $.20^* / .10$
  - GPA („Abiturnote“ 1=best, …, 4=worst): $-.31^* / .06$

- **Predictive validity (multi-level analysis)**
  - Additional sample of teacher candidates ($n = 22$)
  - Instructional quality (student ratings):
    - „Differentiation in teaching“ (PISA-scale) as rated by students: $.37^*$

(see for details, Buchholtz & König, 2015; Buchholtz, König & Dohmen, 2015)
Content

1. Introduction

2. Review of Empirical Studies on GPK

3. Examples of Assessments
   3.1 Paper-Pencil-Measures
   3.2 Videobased Stimulus
   3.3 Demonstration of Teaching Skills

4. Discussion and Perspectives
This Presentation

• What conceptual frameworks have been used to consider GPK of teachers in empirical educational research?

• How can GPK be assessed?

• What do the empirical findings show regarding GPK as an outcome of teacher education?

• What could be recommended for future research?
Discussion

Research on teachers’ GPK
  • growing body of research
  • standardised tests, direct assessment
  • international comparative studies (TEDS-M)

Research questions
  • What is GPK?
  • Can there be a concept of GPK we can agree on?
  • Can we operationalise GPK and measure it?
  • Can GPK be codified as a knowledge base for teachers?
  • Same GPK for in-service teachers and pre-service teachers?
  • How are different forms of GPK be measured?

Measurement issues
  • confirmatory factor analysis (e.g., regarding the dimensional structure)
  • measurement invariance (e.g., across countries)
  • examining validity (e.g., construct, curricular, prognostic validity)
GPK dimensions – suggestions based on a systematic review by König (2014)

- Summary of GPK measurement frameworks (TEDS-M, LEK, BILWISS, COACTIV-R, PLT)

- Suggesting three content dimensions of GPK:

  **Instructional process** (including teaching methods, didactics, structuring a lesson, and classroom management),

  **Student learning** (including their cognitive, motivational, emotional individual dispositions; their learning processes and development; their learning as a group taking therefore into account student heterogeneity and adaptive teaching strategies), and

  **Assessment** (including diagnosing principles irrespective of the subject, evaluation procedures)
### OECD Teacher Knowledge Survey – Test design matrix

Test design matrix serving the development of test items

(Guerriero, 2017)


<table>
<thead>
<tr>
<th>Dimensions of Teachers’ General Pedagogical Knowledge</th>
<th>Recall</th>
<th>Understand/Analyse</th>
<th>Generate/Evaluate</th>
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<td><strong>Instructional Process:</strong> teaching methods, didactics, structuring a lesson, classroom management</td>
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</table>
GPK as part of Teachers Competencies

Teachers’ professional knowledge as part of teachers competencies

(Blömeke et al. 2015)

Pre-Teaching
Lesson Planning (PlanvoLL-D)

In-Teaching
Classroom Management Expertise (CME)

Student Rating of Instructional Quality

Cognitive disposition

Situation-specific cognitive skills

GPK Paper-Pencil-Tests (TEDS-M)
Perspectives for current and future research

Defining the construct of GPK

- content dimensions of GPK (e.g., OECD-ITEL; König, 2014)

- new requirements extending the knowledge base teachers need, e.g., regarding inclusion (König, Gerhard et al., 2017)

- relation of knowledge categories, e.g., between GPK and PCK (König, Doll et al., 2017)

- forms of knowledge, cognitive processes (König, 2013, 2014)

- criterion-related definition of GPK (proficiency scaling) (König, 2009)

- examining the relation between disposition and situations-specific skills (König, 2015; König, Blömeke et al., 2014)
Perspectives for current and future research

This Congress: Symposium 6.1 and 6.2

Innovative Approaches to Teachers’ Professional Competencies in the Area of General Pedagogy

Pedagogical content knowledge versus general pedagogical knowledge: two sides of the same coin? (Strauß et al.)

Teachers' professional knowledge for inclusion: what is it and how can we measure it? (Gerhard et al.)

Constructing proficiency levels in teachers' general pedagogical knowledge: filling the accountability gap of competency measurement (Klemenz & König)

Classroom Management Decision Making: Findings From A Novel Video-Based Measurement (Kramer et al.)

And more…
Perspectives for current and future research

Relating GPK to differentiated measures of OTL in Teacher Education

Recent Analysis:

Perspectives for current and future research

Longitudinal Analyses of the suggested overall chain

Thank you very much for your attention!

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