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TUM School of Education

Methodologies of teacher assessment

IBE Research and Educational Policy Seminar Series
February 20th, 2012

Overview

1. **The conventional teacher assessment**
2. Self-assessment for certain purposes
3. Teacher assessment in research projects
   - COACTIV
   - Video studies
4. Research aiming at instruments (Observe)

Teacher Education in Germany

- Is related to different school types/ levels
- Varies to some extent between the Federal States
- All teachers have to study at least two subjects (+ psychology and educational sciences)
- Three phases
  - Pre-service training at University (4-5 years), Degree: Master or “First State Examination”
  - Legal Traineeship “Referendariat” (2 years), “Second State Examination”
  - Continuing education (life long)
- Teachers normally are civil servants, and obliged to engage in continuing education

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Usual teacher assessment in Germany

- Pre-service training/University: First of all tests, seminar & project papers, reports, bachelor’s thesis, central (State) examinations
- Legal Traineeship: Lesson plans, teaching behaviour, reflection, teaching projects, “Second State Examination” (sitting in on lectures)

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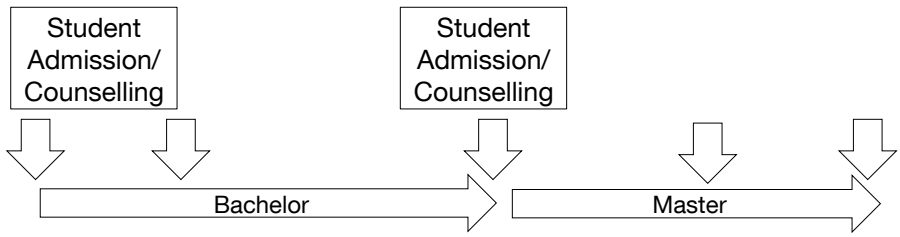
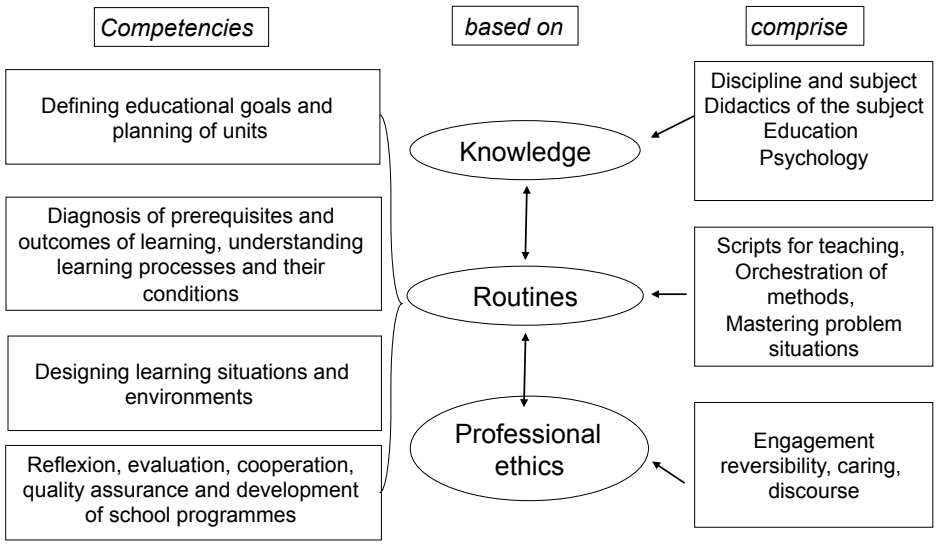
Goal-oriented mentoring and guidance



Components of teacher‘s competence



(vgl. z.B.: KMK-Perspektiven der Lehrerbildung)

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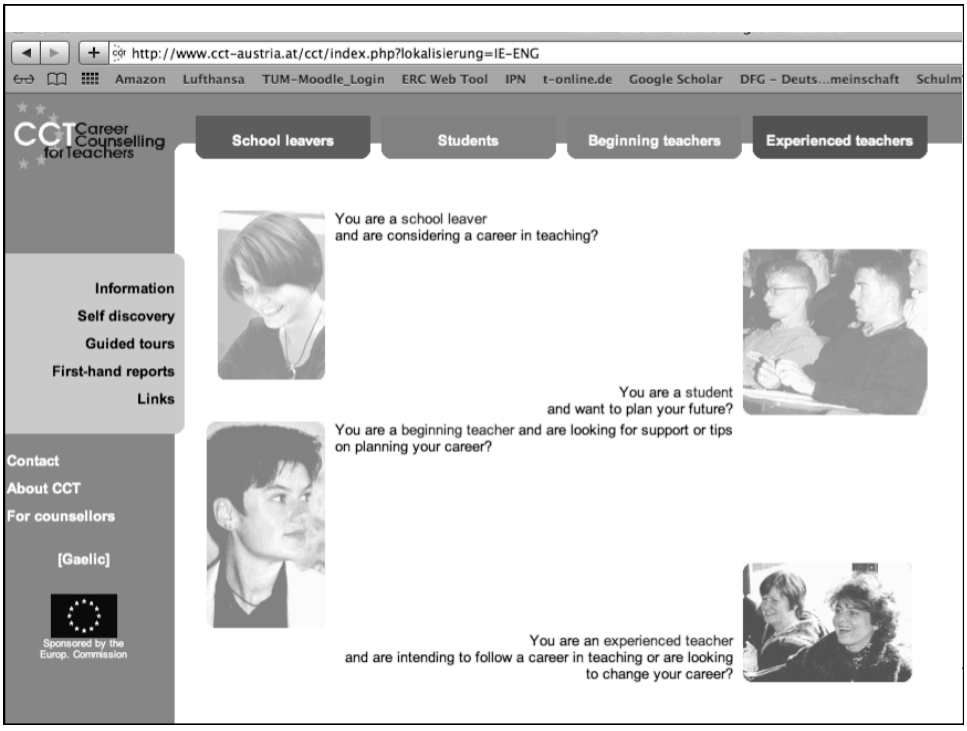

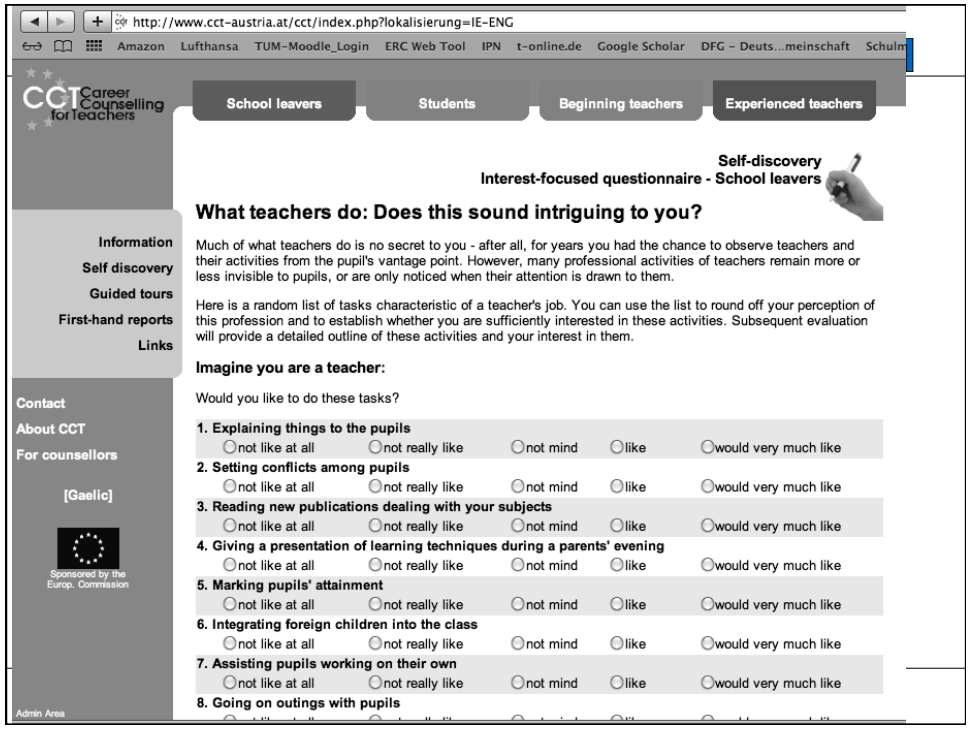

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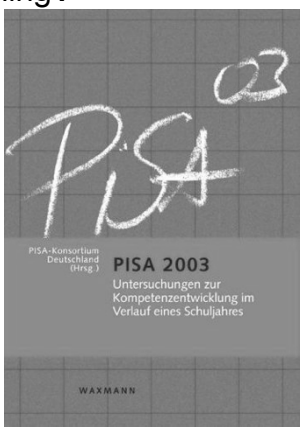
PISA 2003 leading to the COACTIV study: How much do students learn in mathematics over the course of one year of schooling?

In a national extension of PISA 2003 students were tested twice in Mathematics and Science:
At the end of grade 9 and, one year later, at the end of grade 10



Prenzel et al. (2006)

"PISA-I-plus" in Germany

Base: the international PISA school sample (n=198)

+ Two complete classes per school, grade 9 (2003)
+ Additional (national) assessments (second day)
+ Parent questionnaire
+ Teacher questionnaire (Mathematics teachers)
+ COACTIV: Assessment of the mathematics teachers in the selected classrooms
+ Follow-up assessment (mathematics, science) in grade 10 (2004)

Mathematics performance at the end of grade 9 and grade 10 (individual level, latent growth)

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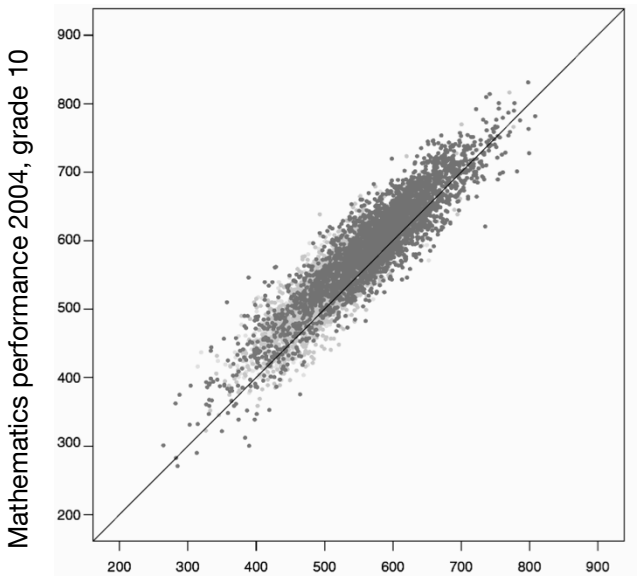

For **58 %** of the students a relevant gain in mathematics performance in the course of one school year was found – for **42 %** not!

Increase on average: 25 points (d = .33)

Mathematics performance at the end of grade 9 and grade 10 (classroom level, latent growth)

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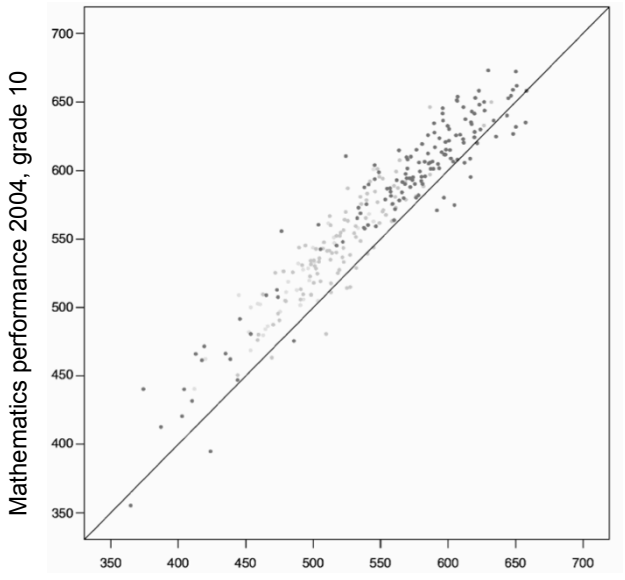
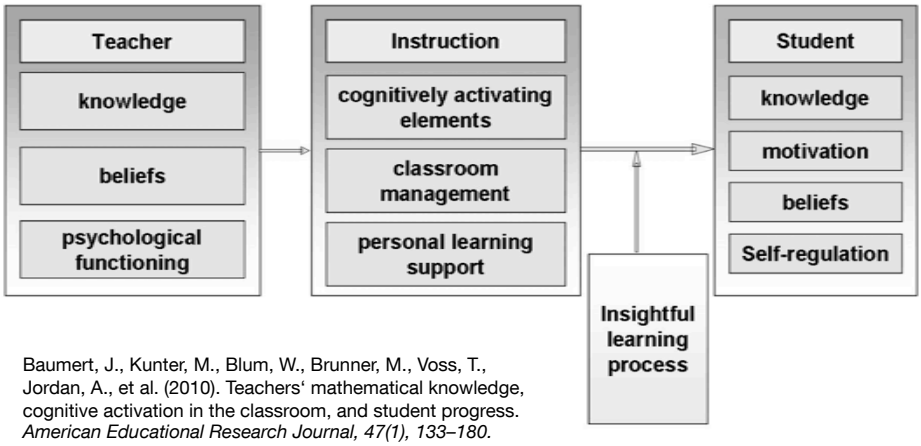


A relevant gain in mathematics performance was found in 89 % of the classes

The COACTIV framework



Baumert, J., Kunter, M., Blum, W., Brunner, M., Voss, T., Jordan, A., et al. (2010). Teachers' mathematical knowledge, cognitive activation in the classroom, and student progress. *American Educational Research Journal, 47(1), 133–180.*

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The COACTIV teacher assessment

- Pedagogical content knowledge (24 items, open ended)
- Mathematical (content) knowledge (13 items, open)
- Teacher's beliefs (self report): "transmission view", "constructivist view"
- Engagement (e.g. enthusiasm for mathematics, career ambitions, self-regulation, ability to cope)

Additional measures of aspects of instruction

- task analysis (homework assignments, exams, tasks used in introductory lessons) (national) assessments (second day)
- Student and teacher ratings of classroom events and behaviours

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Sample items of the knowledge assessment

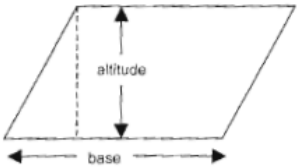
2a: "Square"
("Tasks" subfacet of **pedagogical content knowledge**)

How does the surface area of a square change when the side length is tripled? Show your reasoning.

Please note down as many different ways of solving this problem (and different reasonings) as possible.

2b: "Parallelogram"
("Students" subfacet of **pedagogical content knowledge**)

The area of a parallelogram can be calculated by multiplying the length of its base by its altitude.



Please sketch an example of a parallelogram to which students might fail to apply this formula.

2c: "-1 times -1"
("Instruction" subfacet of **pedagogical content knowledge**)

A student says: I don't understand why $(-1)\cdot(-1) = 1$

Please outline as many different ways as possible of explaining this mathematical fact to your student.

2d: "Infinite decimal"
(Test of **content knowledge**)

Is it true that 0.999999.... = 1 ?
Please give detailed reasons for your answer.

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Instruction: Sample item

A student says:

I don't understand, why $(-1)\cdot(-1)=1$

Please try to help your student to understand that issues using as manifold ways as possible

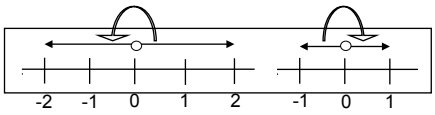
- Instruction: Explaining, showing and representing mathematical issues

Sample item

right

$$2 \cdot (-1) = -2$$
$$1 \cdot (-1) = -1$$
$$0 \cdot (-1) = 0$$
$$(-1) \cdot (-1) = 1$$
$$(-2) \cdot (-1) = 2$$

-1 ↺ +1



"To multiplying by -1 means to turn into contrary: z.B. loan into debt and vice versa. The contrary of -1 (Euro) is 1 (Euro) balance."

"You can illustrate (-1)•(-1) also as double negation"

wrong

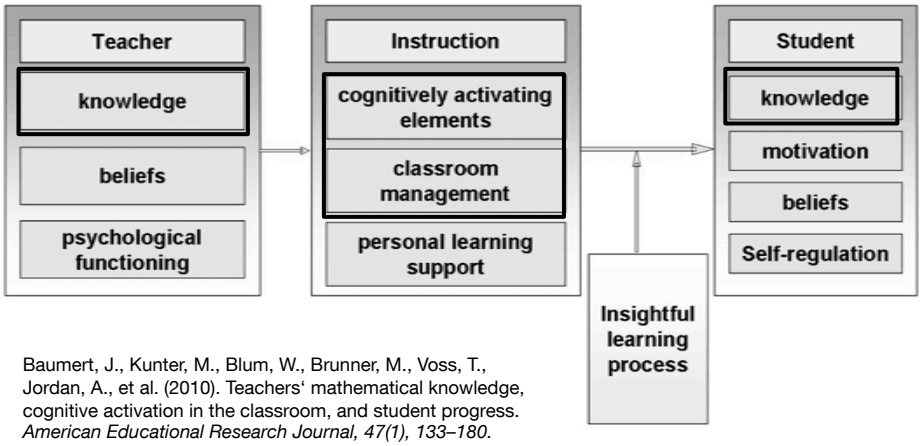
„That's as it is!"

"This is something that has to be learnt and used, and nothing what has to be explained"

"Look for mathematical definitions!"

$$-1 = -1$$
$$(-1) \cdot (-1) = 1$$
$$(-1) \cdot (-1) \cdot (-1) = -1$$
$$(-1) \cdot (-1) \cdot (-1) \cdot (-1) = 1$$

COACTIV findings



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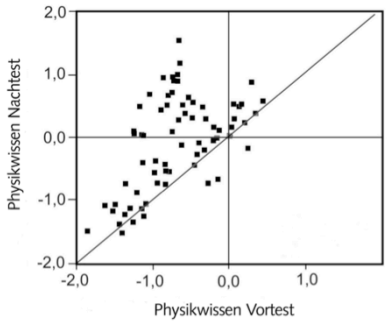
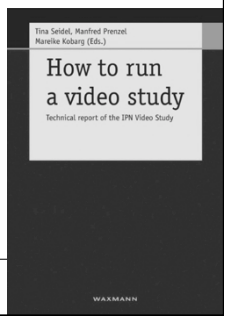
What do students learn in Physics over the course of one year of schooling (in 50 classrooms)?





Seidel, Prenzel et al. (IPN-Video study)

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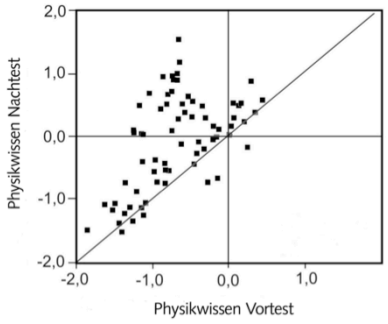
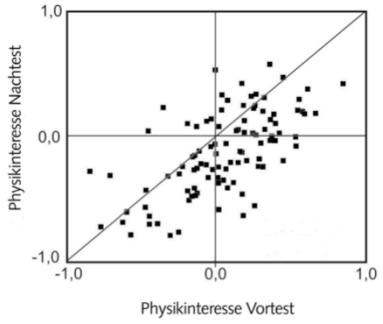
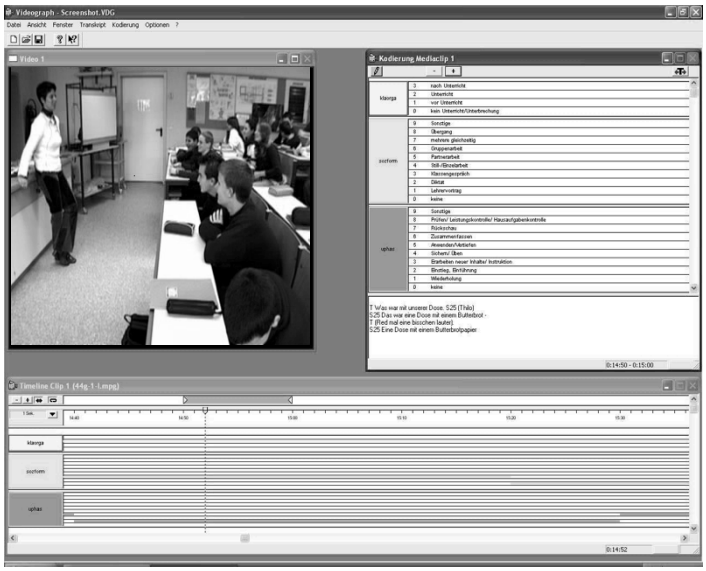
How does the interest in Physics change during this year?





Seidel, Prenzel et al. (IPN-Videostudie)



Software *Videograph*: Rimmele, 2002, 2004

Relevant factors

For example,

- Goal orientation
- Process-oriented teaching
- Inquiry-based science teaching

Assessing professional vision via videotaped classroom situations . . .(Project “Observe”)

Darling-Hammond, 2006; Reusser 2005

- are situated and contextualized stimuli

Miller & Zhou 2007

- represent the complexity of „real“ classroom situations

Goldman 2007

- offer secondhand experiences of teaching