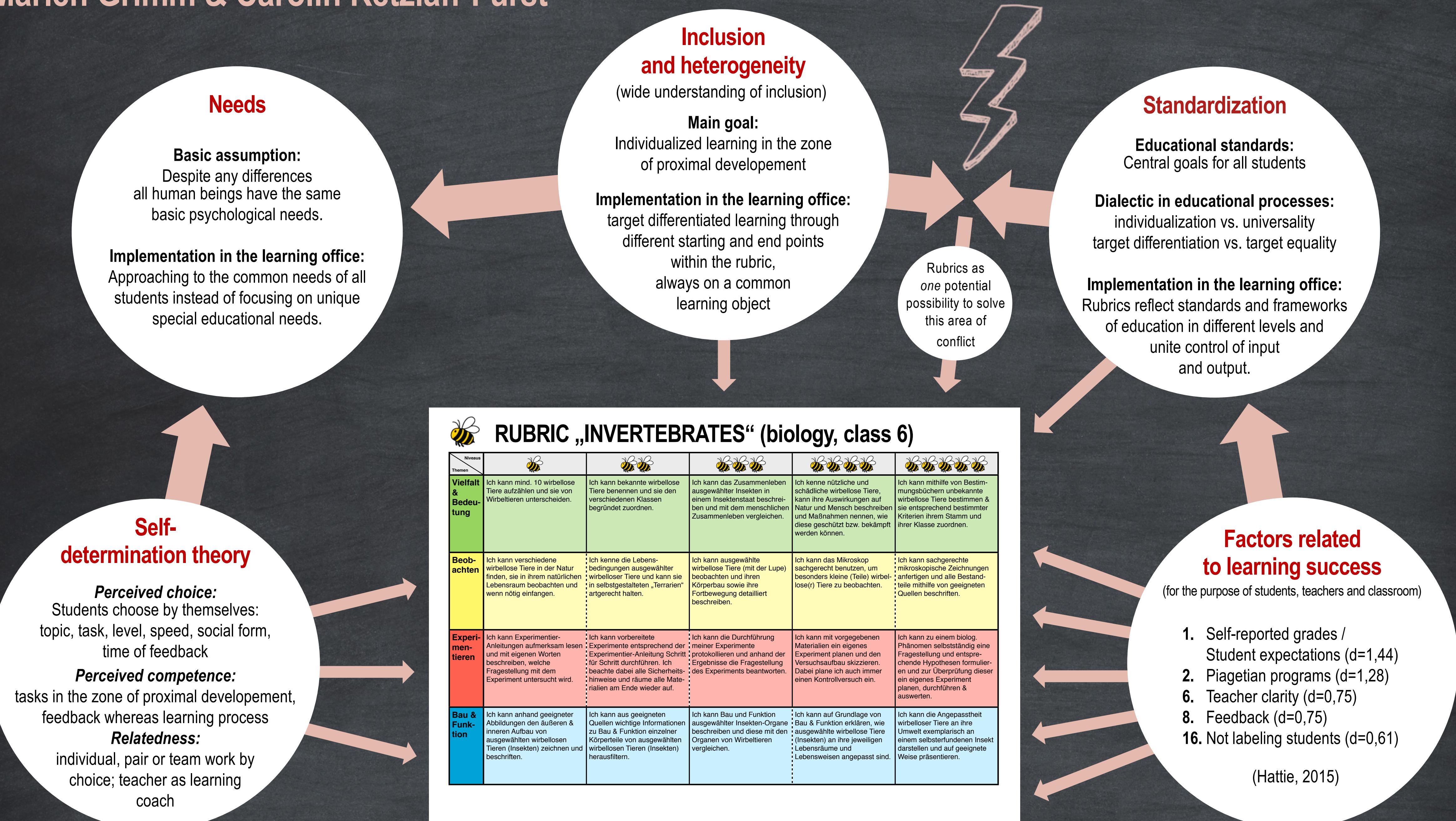




Learning and teaching with rubrics

- Development and evaluation of inclusive learning environments in biology classes to foster students' learning success and motivation

Marlen Grimm & Carolin Retzlaff-Fürst



RESEARCH QUESTION: What are the effects of using rubrics on the rate of **learning success** and **motivation** (in the sense of the basic needs: **perceived choice**, **perceived competence** and **relatedness**) among 6th grade students in heterogeneous learning groups in biology classes?

HYPOTHESIS 1: The use of rubrics has enhancing effects on the rate of **learning success** among students.

HYPOTHESIS 2: The use of rubrics has enhancing effects on the rate of **motivation** (in the sense of the three basic psychological needs: **perceived choice (PCH)**, **perceived competence (PCO)** and **relatedness (REL)**) among students.

MIXED METHODS RESEARCH DESIGN (N = 96; intervention in three classes (N=72), one control group (N=24)):

Test of competence:
- pre-post, currently ca. 192 sheets
- self developed test according to descriptions of competences within rubric

Questionnaire on basic needs fulfillment:
- pre-post (long version: 32 items) and after each lesson (short version: 16 items)
- subscales based on study in didactics of physics (Korner, 2017) with 5 point Likert Scale
- currently ca. 960 sheets (paper pencil)

Participant observation:

- at least 1 participant per class / lesson
- modification of focus from basic needs to individual students
- currently ca. 60 fieldnotes (digital)

Semi-structured interviews:

- directly referring to the intervention
- 15 students from intervention group,
2 from control group
- currently 17 audio-files to transcribe (45min each)

STATISTICAL ANALYSIS with SPSS

HYPOTHESIS 1:

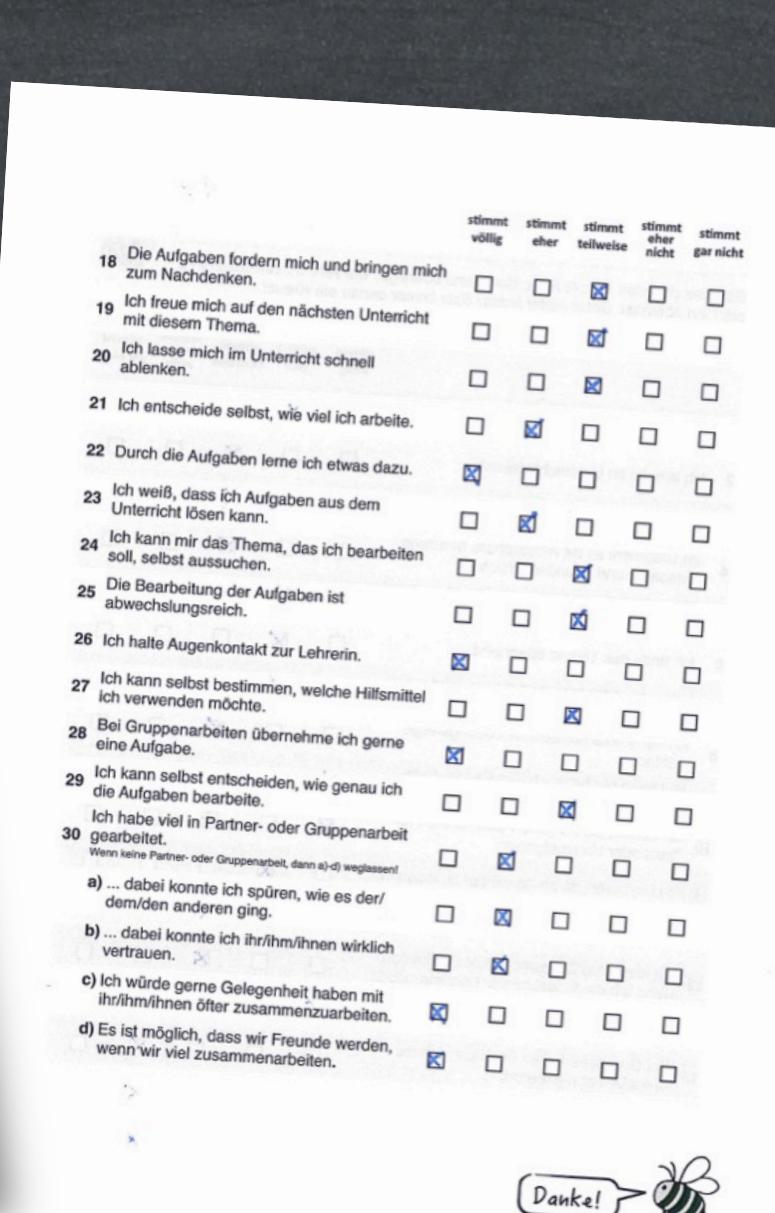
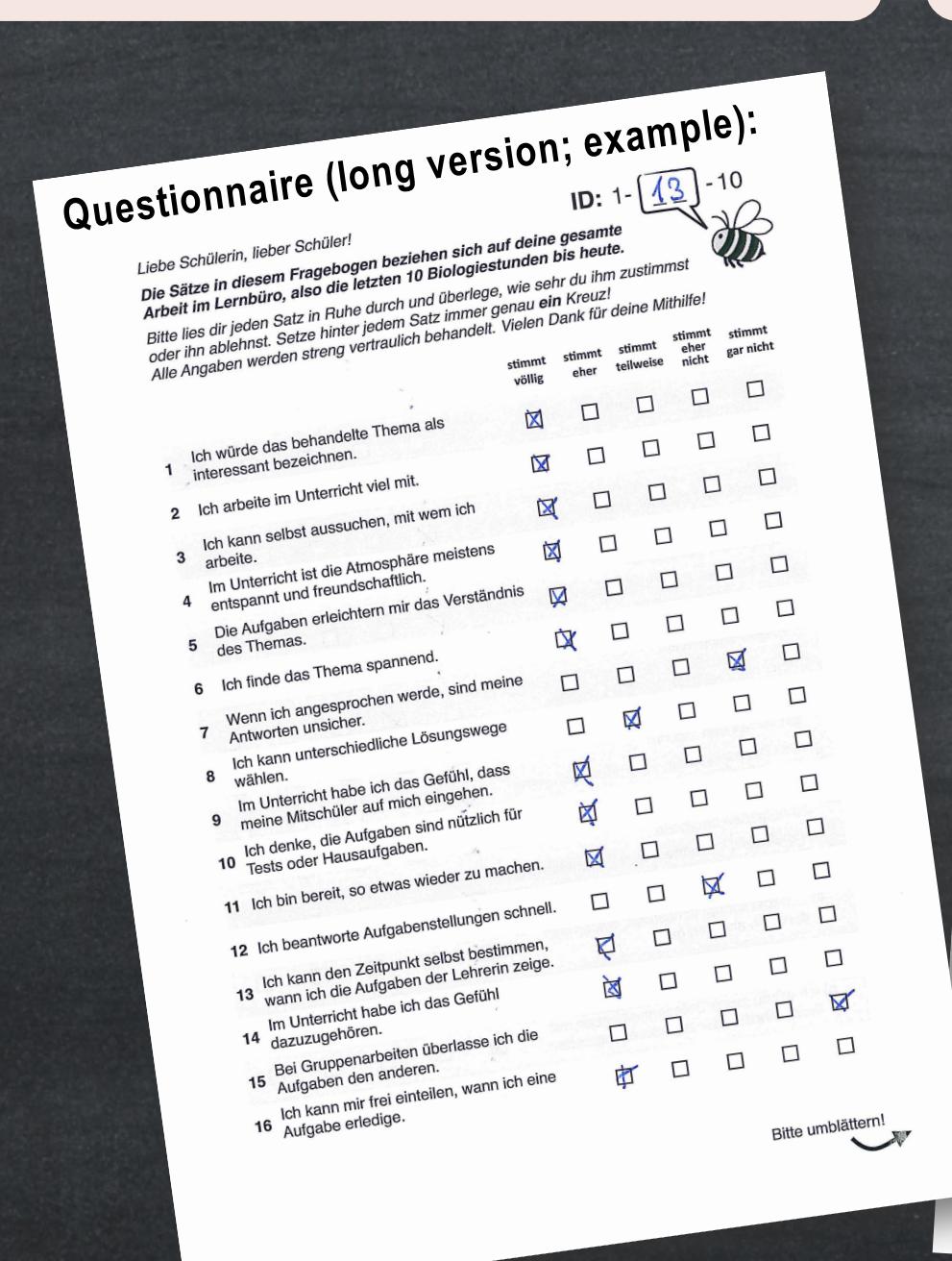
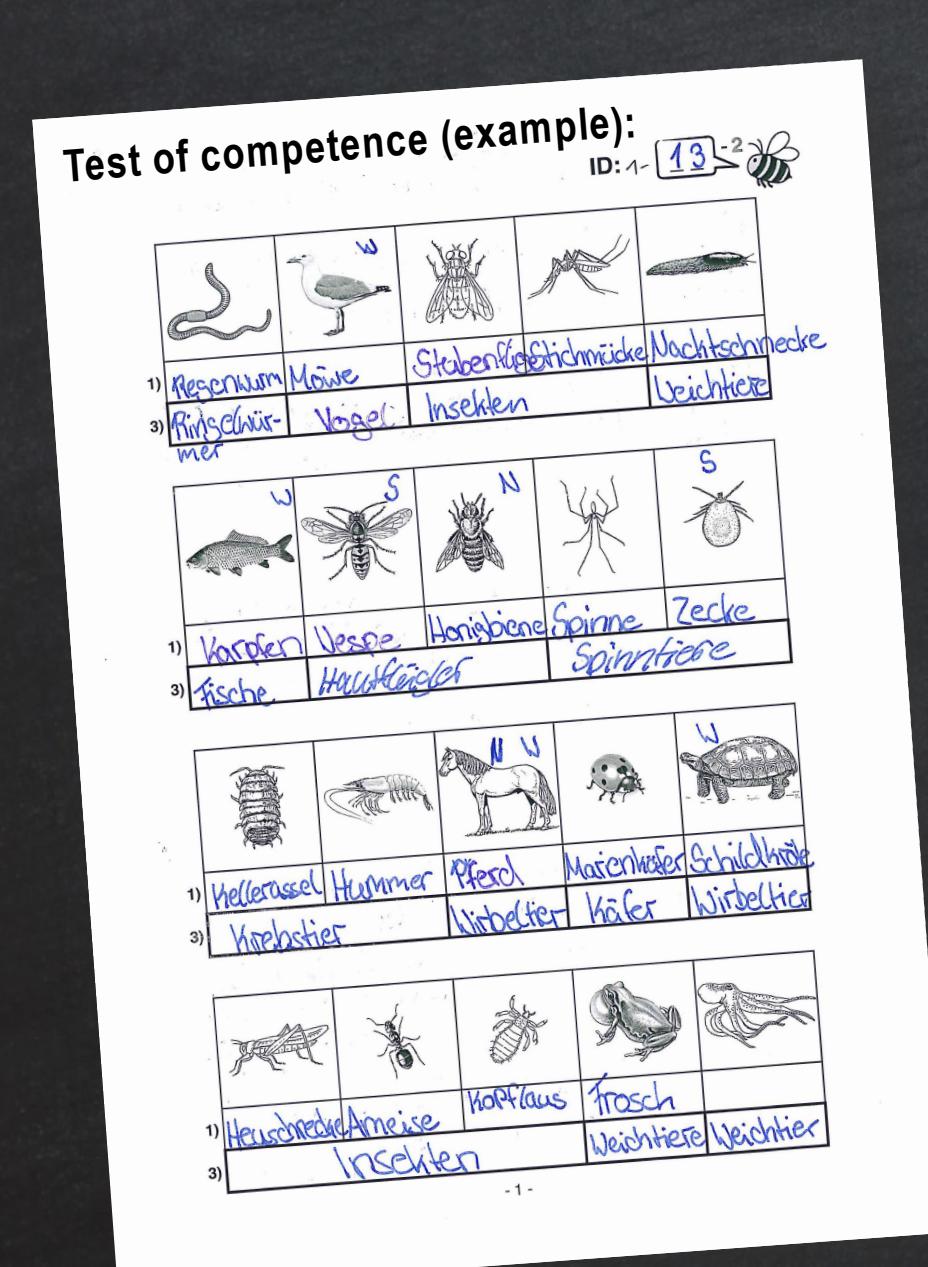
Within intervention and control group the post-test mean scores of the competence test are significantly higher than the pre-test mean scores. The post-test mean scores in the intervention group are equal or higher than the post-test mean scores in the control group.

HYPOTHESIS 2a:

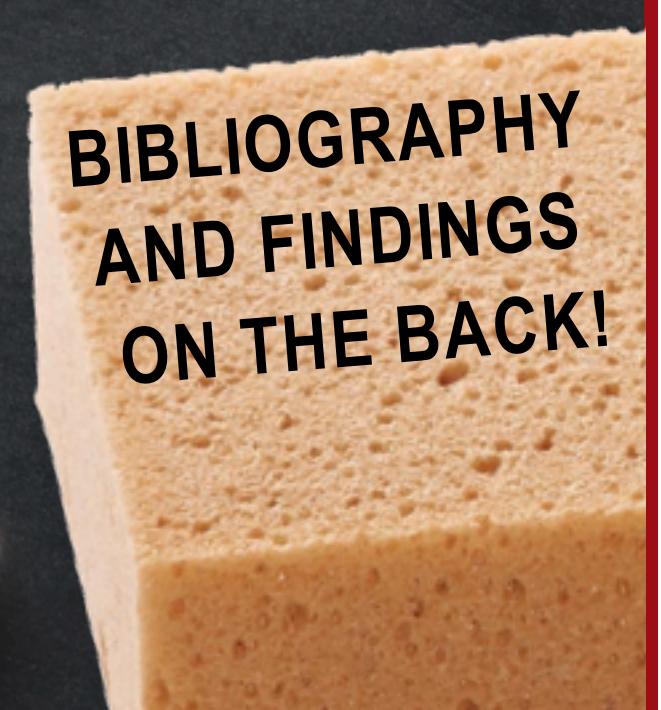
The post-test mean scores of PCH, PCO & REL in the intervention group are significantly higher than the post-test mean scores in the control group. Within intervention group the post-test mean scores of PCH, PCO & REL are significantly higher than the pre-test mean scores.

HYPOTHESIS 2b:

The mean scores of PCH, PCO & REL in the intervention group remain on a high level during time of intervention whereas the mean scores in the control group differ significantly from lesson to lesson.



QUALITATIVE CONTENT ANALYSIS acc. to Kuckartz (2016)



MIXED ANOVA:

- ✓ Homogeneity of covariances
- ✓ Normal distribution in control group
- ✓ Compensation of normal distribution violation in intervention group by adequate sample size ($N > 60$)
- ✓ Violations of sphericity corrected by Huynh-Feldt adjustment

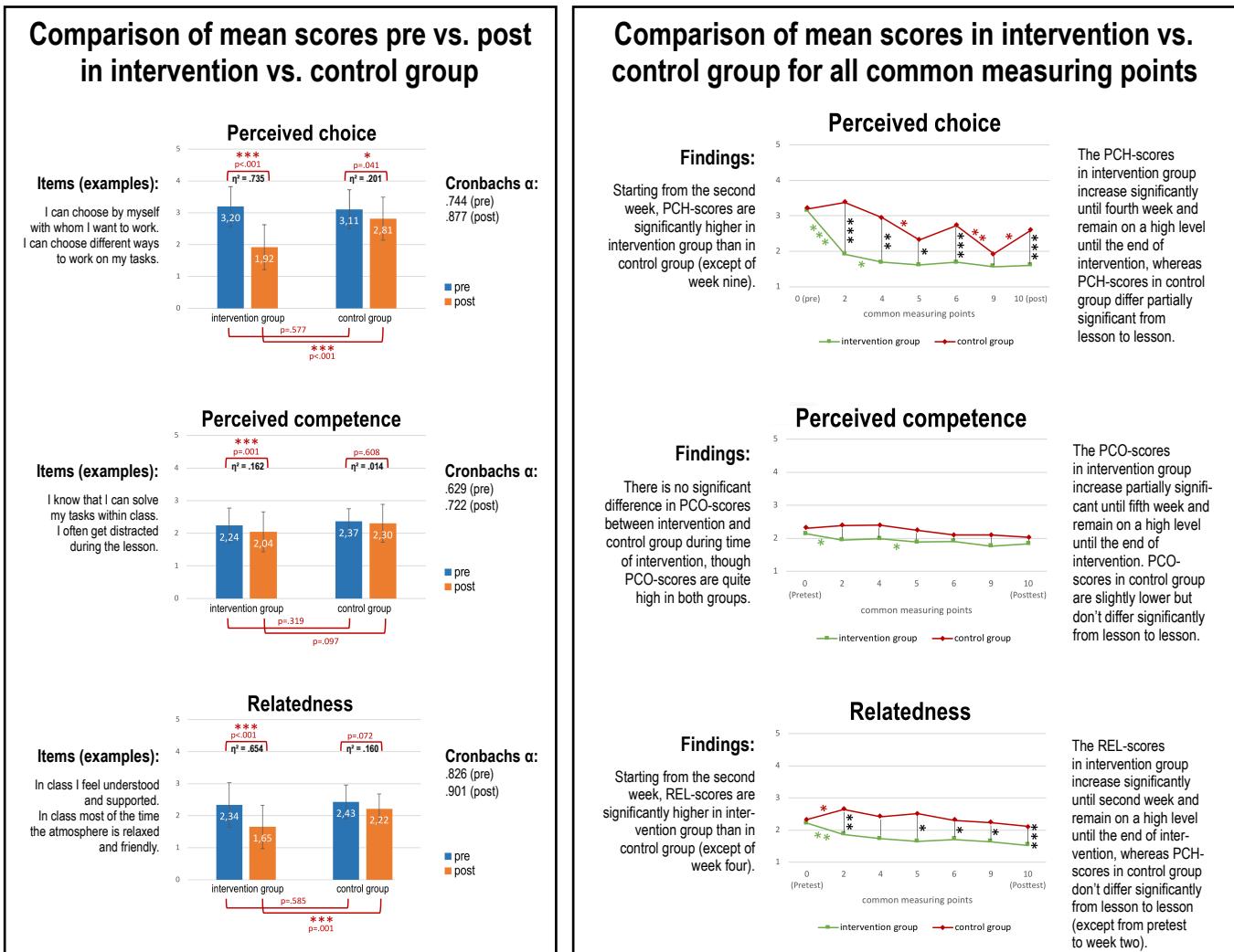
ATTENTION: Inverted 5 point Likert Scale:

1	2	3	4	5
strongly agree	agree	neither agree nor disagree	disagree	strongly disagree

→ falling scores mean increasing results

Significance levels: $p \leq .05^*$ / $p \leq .01^{**}$ / $p \leq .001^{***}$

Effect size: (partial) $\eta^2 \leq .01$ = small / $\eta^2 \leq .06$ = medium / $\eta^2 \leq .14$ = large



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