Student's achievement in cross-curricular problem solving – An empirical study on theory and diagnostics of cross curricular problem solving in higher education

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FOCUS

In addition to domain-specific competencies and knowledge graduates also need the competencies to deal with new and unknown situations in their worklife and they have to be able to adapt to these unknown situations.

⇒ **Therefore, the development of cross-curricular problem solving competencies is a fundamental goal of teaching (Butterfield & Nelson, n.d.).**

AIM

The study intents to clarify students' cross-curricular problem solving competencies.

Central questions are:

- Is the model fit to analyze cross-curricular problem solving competencies?
- If it is, how developed are students' cross-curricular competencies?
- Which other aspects relevant in cross-curricular problem solving can be found (e.g. self-efficacy, etc.)?

HYPOTHESES

- There are differences expected with regard to study experience (semester), age and vocational experience.
- The field of study is expected to have an influence on student's ability to efficiently solve cross-curricular problems.
- Aspects as self-efficacy, study interest and beliefs have an effect regarding student's competencies in solving cross-curricular problems.
- It is assumed that previous results in the correlation of intelligence and problem solving can be reproduced regarding cross-curricular problem solving.

METHOD

⇒ Simulation of the high demands of the professional sphere regarding the structuring of information
⇒ Respondents are required to solve complex cognitive tasks in written form (different realistic,tasks, different modalities of intelligence [numeric, figurative])

Experimental procedure:
A case study was designed. Subjects were requested to adopt the perspective of the employee in the story *(personal assistant to the mayor)* and to solve different cross-curricular problems *(different problems concerning the mayors reelection campaign).*

The study follows a multifactorial cross sectional design:
Students of first, third and sixth semester and different fields of study (humanities: european studies & english studies vs. social sciences: journalism studies & school-psychology) were asked to solve the designed problems.

Covariables:
Students: self-efficacy (Schwarzer & Jerusalem, 2001), study interest (Krapp et. al., 1993), study experience, age, vocational experience, beliefs (own design, Urhahne & Hopf, 2004), Intelligence (APM, Raven, Set I, dt. Häcker & Bulheller, 1998)
Their teachers: beliefs (own design, Urhahne & Hopf, 2004), teaching expertise

FIRST RESULTS

The pretest (N=35 fifth semester student's in business studies) showed ...

... the coherence of the three complexes of tasks (cronbach's alpha between .742 - .785).
... that the problems featured in the test have different levels of difficulty.
... that even fifth semester students show difficulties in solving cross-curricular problems.

THEORY

Till today, the concept of cross-curricular competencies remains somewhat vague (Baumert et.al., n.d.).

Therefore, to design cross-curricular problems, the following assumptions were leading (Fleischer et.al., 2010; Jonassen, 2000; Mayer, 1992):

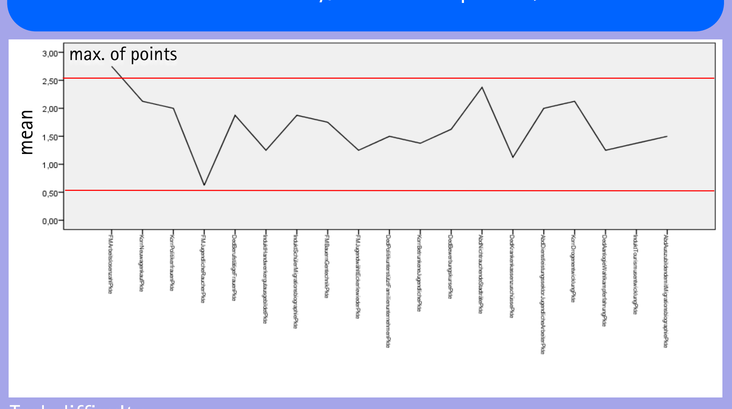
What are cross-curricular competencies?
Cross-curricular competencies are...
- independent from situations and contexts
- relevant in different disciplines and can be distinguished from domain-specific knowledge and competencies
- can be transferred to new situations
- help to deal with complex requirements

How should "problems" and the process of solving problems be defined?
Problem solving (competence) depends on...
- cognitive requirements relevant in different problem solving stages
- the problem variation (structuredness, complexity and situatedness)

TASK DESIGN

1. complex of tasks

Cognitive competencies relevant in analyzing situations (e.g. inductive, deductive thinking, correlation vs. causality, facts vs. opinion)



Task difficulty

Evaluation of different statements on the basis of given information.

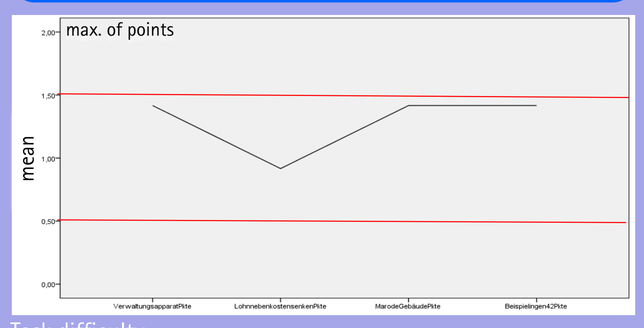
e.g. „The decline of traffic accidents is caused by the decline of buying new cars."

2. complex of tasks

Classification of aims on the basis of different background information.

e.g.: „People of the town ‚Beispielingen' would be more content with the city council if it is reformed following the expert opinion ‚x'."

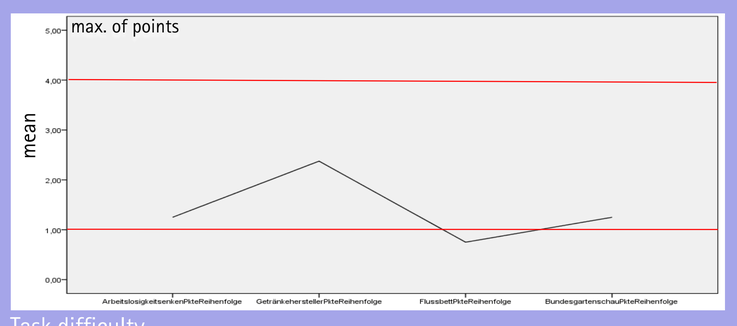
Cognitive competencies relevant in evaluating aims



Task difficulty

3. complex of tasks

Cognitive competencies relevant in arranging a sequence of substeps as a part of action planning



Task difficulty

Arranging different steps to reach a particular aim on the basis of a particular background information.

e.g.: „Organize the business establishment of a beverage manufacturer."

CONCLUSION

For the ongoing main study, items were choosen based on their factor loadings, homogeneity, difficulty, and theoretical aspects.

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