PLS applied in educational psychology: Do motivated teachers have motivated students?

Barbara Hanfstingl\textsuperscript{1}, Ingo C. Riemenschneider\textsuperscript{2}, Irina Andreitz\textsuperscript{1} & Florian H. Müller\textsuperscript{1}

\textsuperscript{1}University of Klagenfurt, Institute of Instructional and School Development
\textsuperscript{2}Graz University of Technology, Institute of Production Engineering

Contents

Our two aims:

• Empirical study (evaluation of an school developmental project)

• Some critical thoughts about SEM
IMST Fund

Aims and philosophy

• Mostly bottom-up approach of instructional and school development
• Support system: financial, organizational, coaching
• Stimulate teachers’ innovations in schools and classrooms
• Development of reflection competence in community of practice

Organizational procedure (1 year projects)

• Teachers are encouraged to submit projects proposals
• Proposals are reviewed by researchers and qualified teachers
• Classroom implementation
• Self evaluation /documentation /publication (e.g. action research)
• Dissemination of the projects

This system needs people’s motivation and autonomy!
Self-Determination Theory (SDT)
Deci & Ryan (e.g. 2002)

Amotivation

Extrinsic Motivation

Intrinsic Motivation

Non-Regulation

Extern Regulation

Introjected Regulation

Identified Regulation

Integrated Regulation

Intrinsic Regulation

Control

Self-determination

Self-determination Index:

\[ \text{SDI} = 2 \times \text{IN} + \text{ID} - \text{IJ} - 2 \times \text{EX} \]

(Levesque et al., 2004)

Self-determination is linked with the support of so called psychological basic needs (autonomy, competence and social relatedness)
In school, there are two important perspectives:

Teachers‘ perspective
Students‘ perspective
Model of Teachers’ perspective
(Pelletier, Séguin-Lévesque, & Legault, 2002, p. 192)

Teachers’ perception of constraints at work

Teachers’ perception of students’ self-determination toward work

Teachers’ self-determination toward work

Teachers’ autonomy support

LISREL, $\chi^2 (87, N = 254) = 109.69, p < .01, GFI = .95, AGFI = .92, CFI = .96, IFI = .96, PGFI = .68$
Changing the causal chain…

Teachers' perception of students' self-determination toward school

Teachers' perception of constraints at work

Teachers' self-determination toward work

Teachers' autonomy support

Correlations:
- .18
- .23
- .27
- .35
- .82
- .87
Our model of self-determination in school

**Teachers’ perspective**

- Perceived constraints/support at work
- Self-determination at work
- Teachers’ beliefs about students’ motivation (class level)

**Students’ perspective**

- Perceived learning environment
- Students’ Self-determination

?
Study designs

- 2004/05, 2005/06, 2007/08: post design
- 2006/07: pre-post design
- 2007/08: post design
- 2008/09: pre-post design including control group
Instruments: teachers

- Self-determination questionnaire  
  (Adapt.: Otis, Grouzet & Pelletier, 2005) 
  - Scales: IN, ID, IJ, EX ($\alpha=.73-.85$) 
  - Self-perception ($\alpha=.63-.80$) / Students’ motivation: classroom level ($\alpha=.73-.91$)

- School environment questionnaire for teachers 
  - Scales: School government, colleagues, parents, administration, ‘public’ ($\alpha=.76-.89$)
Instruments: students

- PISA scales (Haider & Reiter, 2003)
  - Interest, anxiety, self-concept ($\alpha=.81-.84$)

- Self-determination questionnaire (Adapt.: Ryan & Connell, 1989)
  - Scales: IN, ID, IJ, EX ($\alpha=.75-.93$)

- Learning environment questionnaire
  - Autonomy support, support of competence, social relatedness ($\alpha=.67-.82$)
  - Teacher’s engagement ($\alpha=.63$) / relevance of content ($\alpha=.82$)
Sample
school year 2006/2007

• Students:
  N=1386 (female: 46%)
  age: M=14.4 (SD=1.9)

  subjects:
  – Mathematics: 25%
  – Sciences (PH, CH, BIO): 49%
  – Computer science: 14%
  – Interdisciplinary approach: 43%

• Teachers:
  N=85 (female: 60%)

  School types:
  Gymnasium: 25%
  Hauptschule: 45%
  others: 18 %
  missing: 12%

⇒ Heterogeneous and self-selected sample
Results: t1 – t2 (students), 2006/07

Scales: 1=low; 4(5)=high

PISA-Scales: interest, anxiety, self-concept

Learning environment: Perceived Need-Support

Student motivation

Learning environment: relevance of contents, teacher’s engagement

Müller et al. (2007)
Results: t1 – t2 (teachers), 2006/07

Scales: 1=low; 5=high

Perceived pressure from outside

Teachers' perception of students' learning motivation (classroom level)

Teacher's motivation at work

Müller et al. (2007)
Structural equation model (PLS)

N = 42 school classes (2006/07)
black: $\beta$-weights
red: $R^2$

SDI = Self-determination-Index

Müller et al. (2007)
Sample
school year 2007/2008

• **Students:**
  N=1321 (female: 47%)
  **age:** M=14.2 (SD=1.8)

  **subjects:**
  – Mathematics: 35%
  – Sciences (PH, CH, BIO): 59%
  – Computer science: 16%
  – Interdisciplinary approach: 43%

• **Teachers:**
  N=51 (female: 45%)

  **School types:**
  Gymnasium: 35%
  Hauptschule: 45%
  others: 17%
  missing: 3%
Structural equation model (ML)

N = 51 school classes (2007/08)

SDI = Self-determination-Index

Müller (im Druck)

SDI = Self-determination-Index

Fit Indices: $\chi^2= 20.6, df=21, p =.48, CFI=1.00, RMSEA=.000$

AIC: 85.6; BCC: 103.086

Anmerkung:
- Die Schülerdaten sind auf Klassenebene aggregiert worden.
Discussion

Theoretical implication

• The feeling of self-determination predicts interpersonal beliefs and behavior (for example: creating learning environments)

Implication for educational practice

• The results highlight the importance of intervening into the patterns of school system-teacher interaction
• *Enhancing teachers’ autonomy* should be a priority of reforms aimed at changing the school system
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20.03.2009  Müller (im Druck)
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Further Discussion

Theoretical implication

- Causal chain vs. structure (Jöreskog & Wold, 1982; Scholderer & Balderjahn, 2005): Two different jobs.
- Modeling is easy, but is it real?
- How can we avoid constructing models that do not fit reality? Is it possible to find causal chains or structures picturing a whole population? What about a differential point of view?
- Maybe constructivism is underestimated in social and in economic sciences, and as philosophy of science.
Thank you for your attention!
References


Causal chain

Survey dates

Latent variable

Manifest variable
Path selection

- Paths between variables in same time frame are blocked
- All other will be calculated but can be blocked manually as well

![Path selection diagram]

reflective

formative
## Testing vs. generation

<table>
<thead>
<tr>
<th>Location of the variables in the model</th>
<th>Hypotheses testing</th>
<th>Hypotheses generation</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Pinned down by the hypothesis</td>
<td>Determined by external conditions (e.g. survey date)</td>
</tr>
<tr>
<td>Path</td>
<td>Pinned down by the hypothesis; A path that is to be calculated, has to be explicitly selected</td>
<td>free; A path that should be excluded, has to be explicitly selected</td>
</tr>
<tr>
<td>Results</td>
<td>Hypothesis can be kept / must be dropped</td>
<td>Possible Hypotheses can be found, these have to be tested on their own</td>
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