What’s in the black box between learning environments and learning outcomes?

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Outline of this talk

1. Introduction
2. Current models of teacher professional development
3. A multi-layer model of teacher learning and student learning
4. Processes and patterns of student learning
5. Processes and patterns of teacher learning
6. Bridging teacher professional learning and student learning through Lesson Study
7. Conclusions
1. Introduction

Central issues:

1. Why does research on student learning often have so little impact on teachers and teaching?

2. Why does research on teaching and teacher education often have so little impact on student learning?
2. Current models of teacher professional development

- Increase of teacher quality:
  - Knowledge
  - Skills
  - Attitude

- Change in teaching behaviour

- Improvements of student results

School organizational conditions

Important criticism on these models

They are *black box* models

The *processes* of teacher learning and student learning are missing links in these models

Black box models

Features of the intervention

Change in teaching behaviour

Increase of teacher quality

Improvements of student results

School organizational conditions
**Black box models**

Learning environment  Learning processes  Learning outcomes

- Features of the intervention
- Change in teaching behaviour
- Increase of teacher quality
- Improvements of student results

School organizational conditions
Black box models

Learning environment  Learning processes  Learning outcomes

Teacher layer
- Features of the intervention
- Increase of teacher quality
- Change in teaching behaviour
- Improvements of student results

Student layer
- School organizational conditions

School organizational conditions
3. A multi-layer model of teacher learning and student learning

Learning environment | Learning processes | Learning outcomes

Teacher layer

Teacher education – Professional development

Teacher learning processes

Teacher learning outcomes

Student layer

Teacher’s teaching – Students’ learning environment

Student learning processes

Student learning outcomes

School organizational conditions
A multi-layer model of teacher educator learning, teacher learning and student learning

Learning environment

Teacher educator layer
- Teacher educator professional development

Teacher layer
- Teacher education – professional development

Student layer
- Teacher’s teaching – Students’ learning environment

Learning processes

Teacher educator learning processes

Learning outcomes

Teacher educator learning outcomes

Teacher learning processes

Student learning processes

Student learning outcomes

School organizational conditions
4. Processes and patterns of student learning

Qualitative different patterns in the way students learn:

- Reproduction-directed learning
- Meaning-directed learning
- Application-directed learning
- Undirected learning


Personal and contextual factors influencing student learning

Personal factors, for example:
- Age and educational experience
  - Prior knowledge
    - Epistemological development
    - Socio-economic background

Contextual factors, for example:
- Teaching methods used
  - Type of assessment
    - Cultural environment
Student learning processes and learning outcomes

- Learning outcomes are positively related to students’:
  - deep approach to learning
  - self-regulation
  - critical engagement (sometimes)
  - analytical processing (,,)

- And negatively to students’:
  - lack of regulation
  - ambivalent motivation

Learning Patterns in Higher Education brings together a cutting edge international team of contributors to critically review our current understanding of how students and adults learn, how differences and changes in the way students learn can be measured in a valid and reliable way, and how the quality of student learning may be enhanced.

Areas covered include:

• Cultural influences on learning patterns
• Predicting learning outcomes
• Student centred learning environments and self-directed learning
• Mathematics learning
Contemporary educational innovations

Teaching methods aimed to foster

• active
• meaning directed
• application directed
• self-regulated and
• collaborative

student learning
Fostering meaning-oriented and application-oriented student learning

E.g.:
• Assignment based teaching
• Problem / Case based learning
• Project centred learning
• Competency based teaching
• Dual or work-based learning

Best results: gradual increase in self-regulated learning

Problem Based Learning and how students learn

- Discourages undirected learning
- Discourages reproduction directed learning

- Encourages meaning directed learning
- Encourages collaborative learning
- Application directed learning?
- Self-regulated learning?
5. Processes and patterns of teacher learning

An example: Research project on teacher learning in professional practice

- NWO Interrelated Research Project – 3 PhD-students and 1 postdoc
- 94 secondary teachers were followed for a year in their learning experiences
- Among others through digital learning logs (6 a year)
- In the context of the introduction of active and self-regulated learning in the classroom

Digital learning logs

- Who involved?
- What learned?
- Thoughts?
- Concerns or goal?
- Feelings?
- Linkage to SRL?
- How?
- Cause?
Teachers’ learning activities

- Experimenting
- Considering own practice
- Getting ideas from others
- Experiencing friction
- Struggling not to revert to old ways
- Avoiding learning
Personal and contextual factors influencing teacher learning

Personal factors, e.g.:

- Self-esteem, interest in the profession, love of learning
- Professional identity

Contextual factors, e.g.:

- Pedagogy of the intervention/programme
- Leadership for learning
- Collaborative – individual school culture
- School organizational conditions (openness to innovation, learning-orientedness, dominant beliefs in the school, ...)

Interventions to foster meaning-oriented teacher learning

For example:

- Challenge (student) teachers’ assumptions
- Decontextualize (student) teachers’ practices
  - Include diverging perspectives
- Require (student) teachers to study pupil learning
  - Model meaning-oriented learning

Six core features of effective PD models

• Focus on classroom practice

• Active and inquiry-based learning:
  • Collaborative learning

• Duration and sustainability

• Coherence between school, state reforms, policies and aims of PD
  • School organisational conditions (provide time, resources, facilities and support)


6. Bridging teacher professional learning and student learning through Lesson Study

Teacher Learning and Lesson Study in Mathematics Higher Order Teaching and Learning

1 January 2014 – 30 September 2015
1st year : 22 schools participated
2nd year: 59 schools participated

University of Cambridge research team:
Maria Vrikki, Paul Warwick, Neil Mercer & Jan Vermunt

London Borough of Camden School Improvement Service:
Pete Dudley, Jean Lang & Annamari Ylonen

Funded by the London Schools Excellence Fund
Aims for pupils to:

- become fluent in the fundamentals of mathematics
- reason mathematically
- be able to solve problems by applying mathematics to a variety of routine and non-routine problems
Japanese Lesson Study

https://lsip.files.wordpress.com/2007/07/img_0920.jpg
## Coding scheme for the videos

### Final reliable version

<table>
<thead>
<tr>
<th>DIALOGIC MOVES</th>
<th>SCOPE OF DISCUSSION</th>
<th>LEARNING PROCESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>[DM1] Requesting information, opinion or clarification</td>
<td>[S1] Groups of pupils</td>
<td>[DLP] Descriptive processes</td>
</tr>
<tr>
<td>[DM3] Providing evidence or reasoning</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Descriptive vs Interpretative Processes

**DESCRIPTIVE PROCESSES**

So you give them 4 pieces of an orange and say ‘I’ve got 4 oranges and I want to share between 3 people. Each orange has 7 segments.’ [from planning session]

**INTERPRETATIVE PROCESSES**

I think that’s why it’s good. Because it’s sticking with the same type of thing isn’t it? And it’s giving them the chance to feel like they’ve got better and use the resources that they created. [from discussion session]

Patterns in teacher learning

• Application-oriented learning
  • Meaning-oriented learning
    • Problematic learning
Development in teacher learning patterns

Graph showing the quality of teacher learning over time.

- Meaning Oriented Learning
- Application Oriented Learning
- Problematic Learning
7. Conclusions

• We know quite a lot about the student learning processes that mediate between student learning environments and student learning outcomes.

• We begin to develop knowledge about teacher learning processes that mediate between teacher learning environments and teacher learning outcomes.

• Research on how teacher learning and student learning are interrelated is still in its infancy.
A new generation of learning theories will have a multi-layer character.

It will not be enough to develop sub-theories for different populations, but the interdependence and interrelatedness of the sub-theories will be the most important feature of the learning theory itself.
Study the multi-layer model of student learning and teacher learning as a whole

- Cut the model into researchable pieces and bring these pieces together afterwards
- Develop longer research projects and study the whole model from beginning to end
- Cross traditional boundaries and bring together researchers on student learning and teacher learning
- Develop interconnected research projects in which both student learning and teacher learning have a place
Thank you for your attention!

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