‘Begleitforschung’ as contributor to digitisation in vocational education and training (VET) for construction sector – Linking ‘work process knowledge’ to ‘Industry 4.0’

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The research questions

The paper discusses the Learning Layers‘ Construction pilot and newer research on similar innovation agendas with focus on the following questions:

• What role has ‘accompanying research’ played vis-à-vis innovations in practice and knowledge development on them?
• In what ways has the theme ‘work process knowledge’ been influential in the Construction pilot and its follow-up?
• How can the work of Learning Layers’ Construction pilot be related to older and newer innovation agendas?
• How can the theme ‘Industry 4.0’ be related to construction work, related training and to technology-enhanced learning?
Background of the EU-funded RTD project “Learning Layers“ (EU FP7)

Context: European programmes for ICT, Web 2.0 and learning (in work organisations)

- Early push of e-learning technologies vs. limited success with SMEs
- Major projects with larger companies, “knowledge work“ and knowledge management technologies
- New efforts to promote web technologies to support learning in SME clusters
Learning Layers

17+3 partners
2+1 pilot regions and sectors
€13 MM, 30% for innovation
4 years (2012 – 2016)

Informal learning at workplace/
Use of digital media & Web 2.0

Learning at multiple levels
Outline of the Learning Layers‘ Construction pilot ...

Context: Regional pilot activities with relatively open innovation agenda

- **Initial design idea** raised by *intermediate* training centre Bau-ABC (construction sector)

- **Participative design activities** involving developers, trainers, apprentices and researchers

- **Accompanying research** adjusting itself to iterative process and shifts of emphasis
… adjusting the tasks of accompanying research during the iterative processes

- Initial stakeholder interviews
- Co-design workshops => Change of design idea
- Training schemes
- Support for piloting with LL tools => Learning Toolbox
- Outreach activities
- Continuing dialogue
- Documentation and reporting
Conceptual support for project activities in the Construction pilot

Context: Learning Layers “Theory Camp” in RWTH Aachen (March 2014) – preparation, workshops and follow-up

• Revisiting the legacy of earlier approaches to accompanying research (AuT-Begleitforschung; Modellversuchsforschung);

• Revisiting the legacy of Work Process Knowledge network, EU FP 4, Targeted socio-economic research (1998 - 2002);

• Revisiting conceptual approaches to action-oriented learning (Handlungsorientiertes Lernen) and self-organised learning;

=> Commentary notes, working papers, contributions to final deliverables (Methodology documents; Scenarios and models)
Revisiting the legacy of the Work Process Knowledge network

Origins and achievements of the WPK network:

- **Case studies:** *discovery* of *learning potentials* of skilled workers, teams and cross-organisational cooperation in change processes (Boreham, Fischer & Samurçay 2002).

- *The key concept* *work process knowledge* - collective, boundary-crossing and cross-organisational knowledge processes and *patterns of collaboration* that emerged in work processes (Fischer & Boreham 2004).

- **The findings** were *brought together* and interpreted in a period that favoured *basic research* on innovations in working life. It was followed by more utilitarian research agendas and finding periods.
Active piloting: Getting ready to use Learning Toolbox (LTB) in selected apprentices’ projects; Shaping integrative projects; Setting different pedagogic accents with Learning Toolbox
Making use of Learning Toolbox (LTB) in workplace learning and new training initiatives

Three major strands of Learning Layers follow-up:

- **Company-specific pilot projects** with studies on different work processes (*Betriebsbezogene Analysetage*) and subsequent participative co-design workshops (Firma H.)
- **Joint curriculum design** by guest lecturers of CVT schemes and use of LTB as the learner-interface for accessing contents
- Joint development of **core curriculum** and core contents for **training in health and safety** (*Arbeitssicherheit und Gesundheitsschutz*) across different occupational fields

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Learning Toolbox (LTB) vs. older and newer innovation agendas

How to locate the work with LTB vis-à-vis older and newer innovation agendas (see Ahrens & Gessler 2017):

a) *Humanisation of Work/ Arbeit & Technik* – remedial or counter-steering initiatives alongside the ‘mainstream’

b) *Learning organisations/ Lernkultur Kompetenzentwicklung* – putting the main emphasis on organisational potentials

c) *Industry 4.0* - Emerging innovation agendas based on networked production processes and tool configurations
Reflections on ‘Industry 4.0’ from the point of view of social and educational research

Insights into R&D contributions to ‘Industry 4.0’ from the perspective of socio-technical design/learning at work:

a) Hirsch-Kreinsen: Techno-centric vs. socio-technic scenarios => polarisation vs. upgrading of competences (scene-setting);

b) Stich, Gudergan & Senderek: Shaping of networked production systems as chance to create new spaces for technology-enhanced learning (project ELIAS);

c) Ahrens & Gessler: Shaping work-related learning opportunities for learning-restrictive work contexts.

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‘Construction 4.0’, ‘BIM’ and implications for construction work and education/training

Open questions, tensions and implications for construction work and learning potentials at work:

a) ‘Construction 4.0’: Building Information Modelling (BIM) vs. Production intelligence of skilled workers?

b) Training for ‘lean construction competences’ or for ‘mastery of complex construction projects’?

c) Technology-enhanced learning as means to support ‘lean vocational learning’ or ‘enhancement of work process knowledge’?
The research claims

The paper has argued that the Learning Layers‘ Construction pilot is a special case vis-à-vis older and newer innovation agendas in the light of the following claims:

• ‘Accompanying research’ has been strongly in search for innovations in practice to promote knowledge development.

• The theme ‘work process knowledge’ has been central for the co-design, for the use cases and for the follow-up pilots.

• The Learning Layers’ Construction pilot as a project has been a recent mixture of older and newer innovation agendas.

• The theme ‘Construction 4.0’ is characterised by tensions re. design principles, training and technology-enhanced learning.


Further information on the LL Construction pilot and literature references 2(2)


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