# In: Andrej Brodnik and Cathy Lewin (Eds.), IFIP TC3 Working Conference "A New Culture of Learning: Computing and next Generations" Proceedings, pages 405 - 406, Vilnius, Lithuania, July 2015. Facing the upcoming challenges in vocational training with mobile learning

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#### Introduction

- Project MLS Mobile Learning in Smart Factories
- ▶ 3 years, 2 partners:
- VDW-Nachwuchsstiftung
- (Youth development in mechanical engineering) · University of Paderborn
- Research group: Computer Science in Education

#### Vocational education and training in Germany begins with an apprenticeship in the dual education system. It takes place in the

See BMBF (2014b).



# enterprise

備貼

# vocational schools.



# and

### Apprenticeship in mechanical engineering

- Apprentices are mainly satisfied. Only 8.5 percent of them abandon their apprenticeship (BMBF, 2014a).
- The demand on apprentices increased due to the pace of innovation. Apprentices have to gain competencies to apply their knowledge to new situations and to acquire the ability to selfstudy (VDW-Nachwuchsstiftung, 2012).
- The changes also affect trainers in the enterprise. They continuously have to verify the current apprenticeship concept. Trainers have to change their role of craftsmen to learning coaches. They have to realize a project- and process-oriented apprenticeship (VDW-Nachwuchsstiftung, 2012).

#### **Project objectives**

- "The development of a context-sensitive mobile application for learning and working [...] to initialize sustainable learning" (BMBF, n.d.).
- Apprentices will be enabled to obtain new competencies in the working process and to reflect their state of learning.
- Trainers will be enabled to enhance their media competency and to integrate digital media into the daily work routine

#### Project plan

► Figure 1 shows the project plan. The project is in the initial phase. We started first observations to identify use cases for possible learning scenarios and optimal applications of the software.

#### **Application features**

- Figure 2 shows a draft of the GUI. Some features will be:
- Contextual learning modules and training videos
- Didactically prepared work-based learning tasks with option to control the of state of learning
- Didactically prepared protocol for each task Voice, image, and video recording
- Digital manuals related to machine types & controllers
- Virtual workspaces
- Secure data exchange and storage in a private cloud
- Cloud search function
- Professional dictionary



Figure 2: Graphical user interface (draft)

#### Workshop development



Figure 3: Application of the TPACK model: Sus

- TPCK "is the basis of good teaching with technology" (Mishra & Koehler, 2006).
- P: Didactics, C: Mechanical engineering
- Figure 3 shows the suspected knowledge fields of trainers and the researchers.
- Collaboration is highly recommended

## Mobile Learning in Smart Factories (MLS)

		GENERAL TASKS	EVALUATION TASKS
current state	]\$		Initial phase
3 vears		Initialization of panel of experts Software development Implementation of workshops	Oberservations (ethnografic study) Interviews (Critical Incident Technique) Qualitative content analysis
		Milestone: Prototype of software	ready for testing
		Development phase	
	3 years	Evaluation of workshops Software tests and development Quality assurance by experts	Iterative refinement of workshops with examinations Usability tests, System Usability Scale Logfile analysis: Acceptance of system components
		Milestone: Pilot stage completed	
		Final phase	
		Symposium and final report Public product distribution Dissemination to other sectors	Final summative evaluation of the workshops, the software product including educational materials, and the learning processes
	$\nabla$	Milestone: Implementation and evaluation completed	

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#### **Context sensitivity**



- Apprentices
  - · Registration (apprenticeship year, personal data) Optional placement test
- → Learning recommendations
- Workplace
- QR codes on machines (see Figure 4)
- $\rightarrow$  Topics for type of machine and machine control

#### Current state and results

- Initial meeting with participants from project partners, schools, and industry
- · Comparison of software frameworks and hardware,
- Observations at 2 vocational schools and 1 company · Apprentices mostly do not use computers at their
- workspace. They had 3-5 sheets of paper · Idea: Use animations/videos to show wrong machine
- settings and breaking material · Idea: Use tablets for telephony and video recording,
- if machine is broken and support is needed
- · Privacy issues are important contents for workshops · Display remaining time for tasks
- · Possibility to examine, if tasks have been done

#### Future work

Requirements engineering

- Continue the observations at 1 new vocational school and 3 remaining apprenticing companies
- Start interviews with trainers to collect interests and knowledge gaps in computer science topics
- → Conception and refinement of workshop contents

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Figure 1: MLS project phases and task overview

- Application of TPACK. T: Media literacy and technology

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