The European Teaching Factory Paradigm

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Maximising skills for jobs and jobs for skills
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Introduction

Manufacturing, defined as the transformation of materials and information into goods for the satisfaction of human needs, is one of the primary wealth-generating activities of any nation [Chryssoulouris et al., 2008]

The European Technology Platform for Future Manufacturing Technologies (Manufuture) has identified the manufacturing education as a major driver to achieving excellence in industry and society [Manufuture High Level Group and Implementation Support Group, 2006]

To respond to this role, manufacturing education should follow new approaches so as to prepare industry for the next-generation innovation and the support of its growth
Introduction

Manufacturing education will be faced with major challenges in the years to come [Chryssolouris et al., 2008]

New skills will be required by the future “knowledge workers”, thus, new effective methods to deliver them will be required

Engineers and blue-collar workers will need new life-long learning schemes to be assisted in keeping up with the pace of change

An adaptation of the learning content and its delivery mechanisms to the new requirements of knowledge-based manufacturing is required
Introduction

agine Manufacturing cannot be handled efficiently, only in the classroom

The development of educational curricula has not kept pace with the growing complexity of industry, technology and economy

Research outcomes of educational institutions are typically presented to the scientific community without having been directly accessible to industry

Within this context, industry may not either comprehend or adapt to the technological advances in a direct way

The promotion of a novel approach to manufacturing education that would integrate education, research and innovation, emerges as a key challenge
The Teaching Factory Paradigm

Teaching Factory

Manufacturing  Education

- Product/Process
- Young Engineers

- Practice theory
- Observe problem solving techniques/methods
- Learn to work in teams
- Come in touch with real problems/cases

Core competence for Engineers  “Problem Solving” capacity
The Teaching Factory Paradigm

... industrial practices to the classroom

... “new” knowledge to the factory

KNOWLEDGE

research

education

innovation

The Teaching Factory as a 2-ways knowledge communication channel

- **Students** in the classroom act as the knowledge “receivers”
- On the industry side, **engineers introduce and present real shop floor problems**
- The **communication and interaction** is done on a **Virtual Operation Scheme**

- **Engineers** at an industrial site act as the knowledge “receivers”
- Knowledge communication using both **physical and virtual** operation schemes
- Academic facilities as test-beds for presenting, simulating and proposing **new solutions to industrial problems**
A Knowledge Partnership for the definition and launch of the European *Teaching Factory* paradigm in manufacturing education

Dec 2011 – May 2013

http://www.knowfact-project.eu/
KNOWFACT Pilot: Construction Machinery Project

**Industrial problem:**
- line balancing of a new production area
- planning of material kitting area

4 Volvo engineers
20 LMS students
6 weeks (2h session per week)
KNOWFACT Pilot: Construction Machinery Project

**Industry**

**knowledge transfer**

**Academia**

**Industrial problem:**
- new integration and control architecture for industrial robots

5 FESTO engineers
7 LMS research engineers
3 weeks (1h session per week)

**Unit Level: Local Autonomous Decision Making**
- Local coordination
- Monitoring operations
- Main tasks:
  - Automated robot program generation, retrieval and execution
  - Gripper exchange coordination
KNOWFACT Pilots Outcome

Teaching Factory added value for **Industry**:
- Ideas/solutions not considered during standard company processes
- Wider range of solutions → **better decision support**
- Factory people interact with pool of students → **new way of thinking and problem solving capacity**
- Outsourcing → **benefits the factory** (resources) and the **academia** (access to real industrial problems)

Teaching Factory added value for **Academia**:
- **Bring students in direct touch** with industry
- New kind of teaching **not available in theoretical lectures**, or one-time labs
- **Students deepen their knowledge** and apply that in practice, while addressing real-life problems, and working in **industrial practice terms**.
KNOWFACT Pilots Outcome

Tackling **skill mismatch** through the **Teaching Factory:**

- Integrating academic and industrial practice can **improve the skill development process** of future talents through their synchronous **exposure to the real-life problems of industry**

- Academic **curricula** are enriched with **knowledge** stemming directly from the modern **everyday manufacturing business**

- Because of this new educational approach, manufacturing becomes more **attractive to future talent**
Conclusions

Teaching Factory innovativeness:

- European-wide initiative for boosting innovation performance by accelerating the transformation of innovative ideas and research outcomes into new products and processes.
- Two-way knowledge transfer between academia and industry aiming at preparing a European pool of talent for knowledge-intensive manufacturing.
Thank you for your attention!

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