



Parallel Workshop Industrial Education

On a Vision for Manufacturing Education

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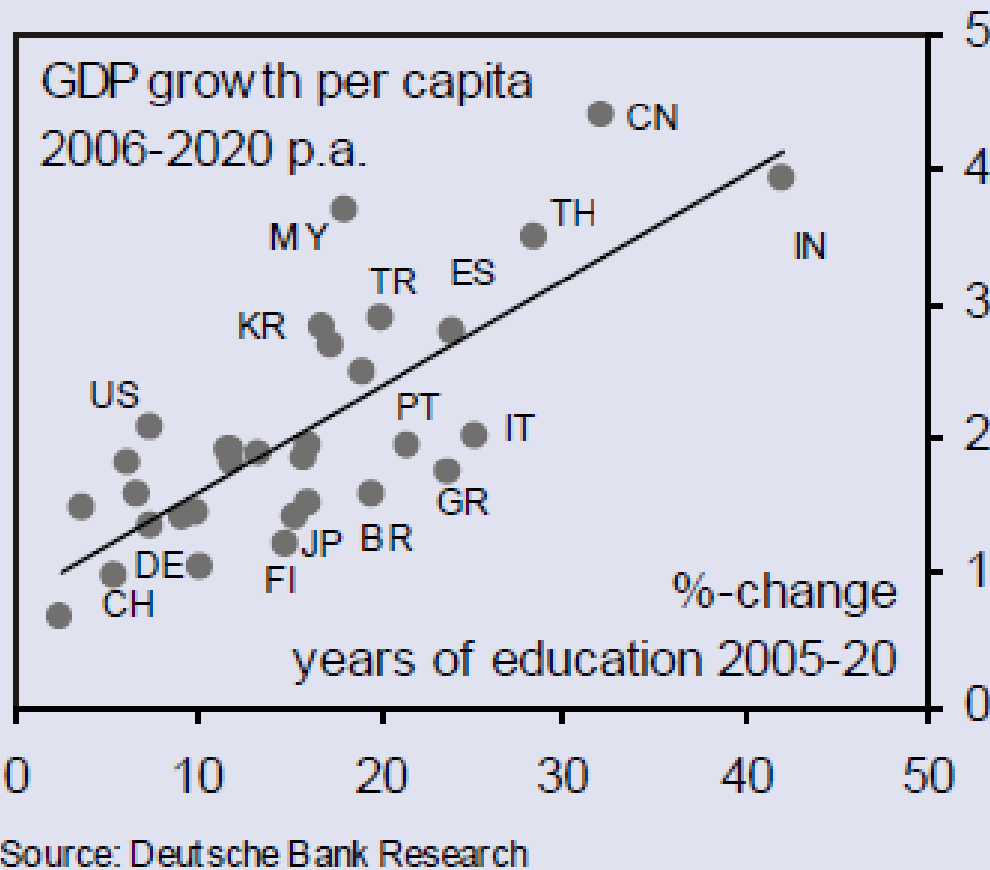
... in the years of economic crisis,

education

is a strategic asset of the societies in
their way to

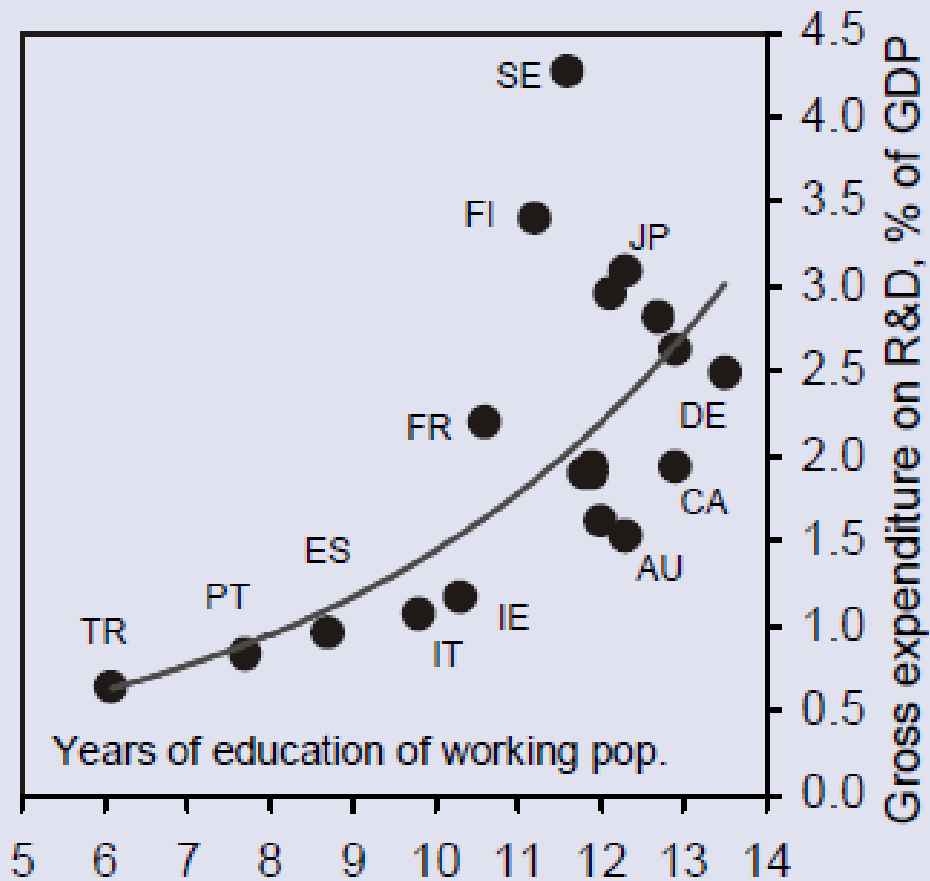
economic growth

More human capital = strong GDP growth per capita



Impact of years of education on GDP growth

Education & research correlate



Source: Deutsche Bank Research

Impact of years of education on R&D expenditure

... manufacturing education
addresses significant **challenges** in
view of preparing the human capital of
the Factories of the Future ...



Shortage of skilled manufacturing workers

Manufacturing is gradually recovering

Bringing manufacturing jobs back home is a strategic future goal



How will we find the required skilled workers?

Rough estimations in USA indicate that in order to keep the manufacturing workforce headcount stable, there is a need to **increase manufacturing training by about 200%**

The main reason for the shortage is the **poor public image of manufacturing and manufacturing careers.**



Need for new skills

New skills are required by the future generations of
“knowledge workers”

- adaptation of the educational content and its delivery mechanisms to the new requirements of knowledge-based manufacturing,
- provision of integrated engineering competencies and strong multi-disciplinary background, including soft skills,
- promotion of internalization



Weak innovation activity

European manufacturing suffers from a **weak innovation activity**. EU is not so good at transforming new ideas into new products and processes.

European enterprises consider the lack of qualified personnel and the lack of information on technology as being major factors hampering innovation today.

(Source: Eurostat – Science, Technology & Innovation in Europe, 2008)

Promoting creativity and innovative spirit within the education systems would therefore be a major challenge.



... multi-level activities are
required to promote the **societal
appeal** of manufacturing ...

How to improve societal appeal ?

- Improve physical image of manufacturing by opening modern factories to students for demonstrating today's high-tech, clean and safe technologies
- Carry out & publish studies on the income & ROI of a skilled manufacturing career demonstrating the actual economic advantages wrt. to other disciplines
- Highlight the signs that manufacturing is starting to come back & the fact that today most service jobs are more exposed to offshoring than manufacturing



... new **learning paradigms** are
needed to help integrate research,
innovation and education in
manufacturing ...



... new **technology frameworks**
are required to address future
challenges and support the needs
of tomorrow's
"knowledge workers" ...



manufacturing
research

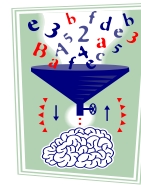


*new
knowledge*

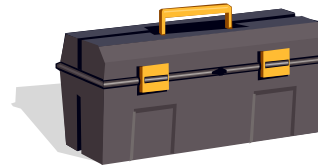


industrial
practice

organize / classify knowledge



build-up knowledge delivery tools



diffuse knowledge



**New ICT
frameworks**

An indicative R&D case

I-CONIK

Advanced User Interfaces and game-based framework for on-the-spot shop-floor training

- ❑ Use of AR technology for information propagation
- ❑ Simple and efficient interfaces for inter-enterprise collaboration, tailored to the stakeholders' needs
- ❑ Intuitive representation of metrics and push-notifications
- ❑ Intelligent and cognitive-friendly game-based training scenarios and tools that aim to reduce error-proneness



... a MANUFUTURE **initiative** on Manufacturing Education ...



Objectives

- ✓ Launch a Manufuture Work Group on Education
- Analyze challenges & suggest future actions
- Define a Manufacturing Education Vision 2020
- Launch some education-oriented pilots



Some first views to the future

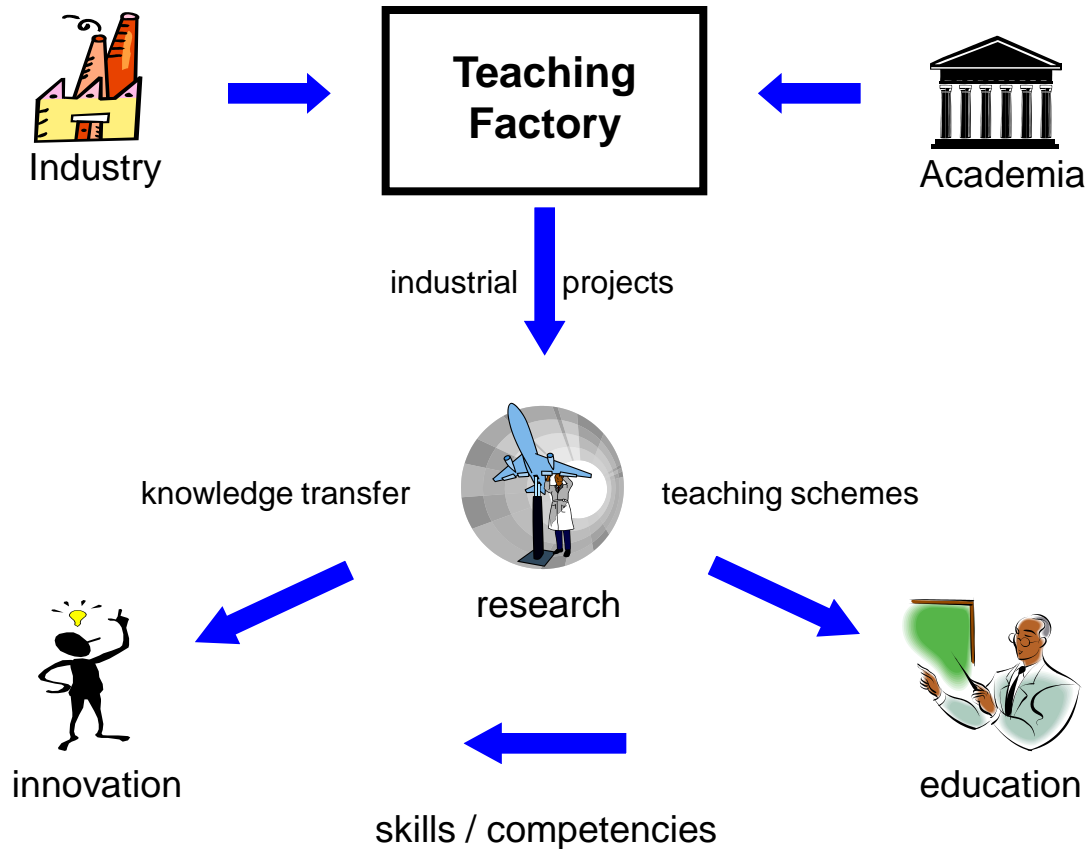
- The social behavior and knowledge of the young engineers is a key issue to be considered
- The required pedagogical attitude and engineering background / experience of the teachers / trainers should be addressed
- There is a need to revisit the studies content and delivery schemes to better reflect today's knowledge
- There is a need to stimulate knowledge generation and ensure efficient transfer of its benefits to the manufacturing sector



Some first views to the future

- In the new knowledge based-industry, new skills together with a broader scientific and technical background will be required.
- The organizational aspects of the educational systems and the priorities for education are two major aspects that must be addressed
- Need to address the international perspective of manufacturing education and consider relevant activities (e.g. at IMS level)
- Manufacturing education should be considered within the knowledge triangle framework (research-education-innovation)





The Teaching Factory paradigm

Thank you for your attention !

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