The value of globally available tools

Ari Korhonen and Lauri Malmi, Helsinki University of Technology
Arnold Pears, Uppsala University

OUTLINE

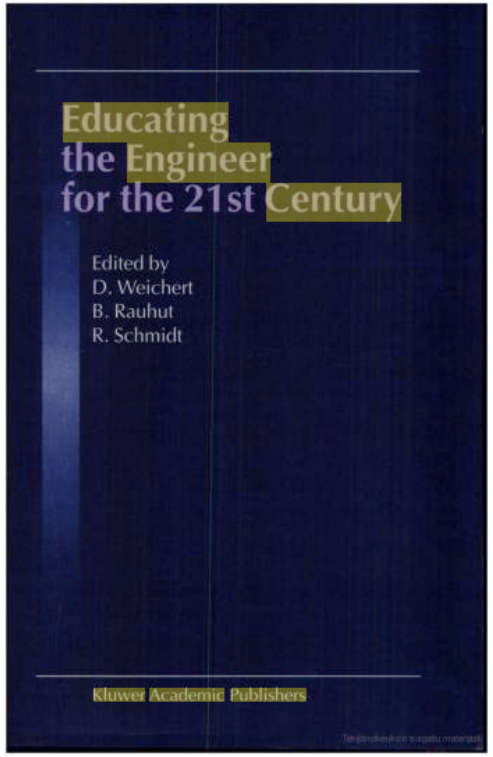
The value of globally available tools

- Skills of the global engineer
- Educating the global engineer
- Engineering education research
- Case: Computing education research
- Koli Calling conference
- Dissemination of best practices and tools
- Discussion

Global engineer

“What can the universities do to make of a student a successful global engineer?” - Bernold Richerzhagen in [1]

- **Knowledge of foreign cultures**
- **Practical experience in manual capabilities**
- **Professional experience**
- **Health**
- **Economical knowledge**
- **Technical knowledge**



[1] Educating the Engineer for the 21st Century, Kluwer Academic Publishers, 2001

Global engineer

"What can the universities do to make of a student a successful global engineer?" - B. Richerzhagen in [1]

- **Knowledge of foreign cultures**
- Practical experience in manual capabilities
- Professional experience
- Health
- Economical knowledge
- Technical knowledge

"An international study would open the horizon of the engineer which is an important benefit."

[1] Educating the Engineer for the 21st Century, Kluwer Academic Publishers, 2001

Global engineer

"What can the universities do to make of a student a successful global engineer?" - Bernold Richerzhagen in [1]

- Knowledge of foreign cultures
- **Practical experience in manual capabilities**
- Professional experience
- Health
- Economical knowledge
- Technical knowledge

"A short practice in a workshop before the start of the study would be very useful to avoid having two left hands."

[1] Educating the Engineer for the 21st Century, Kluwer Academic Publishers, 2001

Global engineer

"What can the universities do to make of a student a successful global engineer?" - Bernold Richerzhagen in [1]

- **Knowledge of foreign cultures**
- **Practical experience in manual capabilities**
- **Professional experience**
- **Health**
- **Economical knowledge**
- **Technical knowledge**

"Regular visits of manufacturing companies would be an enormous enrichment of the study. This aspect cannot be valued highly enough."

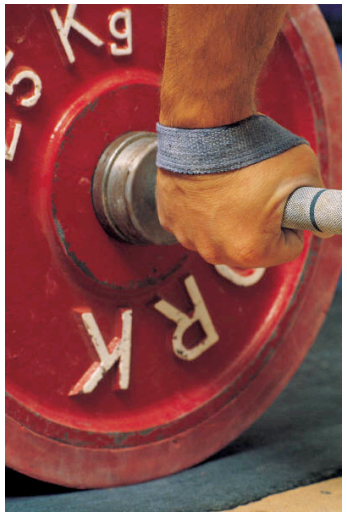
[1] Educating the Engineer for the 21st Century, Kluwer Academic Publishers, 2001

Global engineer

"What can the universities do to make of a student a successful global engineer?" - Bernold Richerzhagen in [1]

- **Knowledge of foreign cultures**
- **Practical experience in manual capabilities**
- **Professional experience**
- **Health**
- **Economical knowledge**
- **Technical knowledge**

"The importance of the skill to maintain good health is underestimated. Today's 40-years old manager show illnesses as 60-year old counterpart in the past."



[1] Educating the Engineer for the 21st Century, Kluwer Academic Publishers, 2001

Global engineer

"What can the universities do to make of a student a successful global engineer?" - Bernold Richerzhagen in [1]

- Knowledge of foreign cultures
- Practical experience in manual capabilities
- Professional experience
- Health
- **€conomical knowledge**
- Technical knowledge

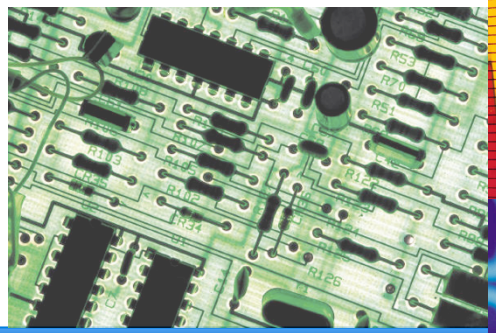
"Not learning by heart of definitions but economical basic knowledge from the practice allowing the engineer to find his way in the jungle of the economic world."

[1] Educating the Engineer for the 21st Century, Kluwer Academic Publishers, 2001

Global engineer

"What can the universities do to make of a student a successful global engineer?" - Bernold Richerzhagen in [1]

- **Knowledge of foreign cultures**
- **Practical experience in manual capabilities**
- **Professional experience**
- **Health**
- **Economical knowledge**
- **Technical knowledge**



"Redefine the curriculum at the technical universities, shorten the study length, and improve the education capabilities among the university teachers."

[1] Educating the Engineer for the 21st Century, Kluwer Academic Publishers, 2001

"Redefine the curriculum at the technical universities"

- **ACM curricula recommendations**

> **"In the decades since the 1960s, ACM, along with leading professional and scientific computing societies, has endeavored to tailor curriculum recommendations to the rapidly changing landscape of computer technology."**

"Redefine the curriculum at the technical universities"

Computing Curricula 2005: The Overview Report

CC 2005 provides undergraduate curriculum guidelines for five defined sub-disciplines of computing: Computer Science, Computer Engineering, Information Systems, Information Technology, and Software Engineering.

Computer Science
CS2008 Curriculum Update: The Computing Curricula Computer Science Volume is complete and approved.

CC 2001: Curriculum Guidelines for Undergraduate Degree Programs in Computer Science

Computer Engineering
CE 2004: Curriculum Guidelines for Undergraduate Degree Programs in Computer Engineering

Information Systems
IS 2002: Curriculum Guidelines for Undergraduate Degree Programs in Information Systems
MSIS 2006: Model Curriculum and Guidelines for Graduate Degree Programs in Information Systems
IS Curriculum Development Wiki: A wiki supporting the ongoing development of Information System undergraduate curriculum is now available.

Information Technology
IT 2008: The Computing Curricula Information Technology Volume is complete and approved.

Software Engineering
SE 2004: Curriculum Guidelines for Undergraduate Degree Programs in Software Engineering

"Redefine the curriculum at the technical universities"

Computing Curricula 2005: The Overview Report
CC 2005 provides undergraduate curriculum guidelines for five defined sub-disciplines of computing: Computer Science, Computer Engineering, Information Systems, Information Technology, and Software Engineering.

Computer Science

CS2008 Curriculum Update: The Computing Curricula Computer Science Volume is complete and approved.

CC 2001: Curriculum Guidelines for Undergraduate Degree Programs in Computer Science

Computer Engineering

CE 2004: Curriculum Guidelines for Undergraduate Degree Programs in Computer Engineering

Information Systems

IS 2002: Curriculum Guidelines for Undergraduate Degree Programs in Information Systems
MSIS 2006: Model Curriculum and Guidelines for Graduate Degree Programs in Information Systems
IS Curriculum Development Wiki: A wiki supporting the ongoing development of Information System undergraduate curriculum is now available.

Information Technology

IT 2008: The Computing Curricula Information Technology Volume is complete and approved.

Software Engineering

SE 2004: Curriculum Guidelines for Undergraduate Degree Programs in Software Engineering

Engineering education research

"shorten the study length, and improve the education capabilities among the university teachers"

- **Dissemination of Best Practises in Engineering Education**
  - Objectives,
  - Content,
  - Methods and
  - Tools

Engineering education research

"shorten the study length, and improve the education capabilities among the university teachers"

- **Dissemination of Best Practises in Engineering Education**
  - Objectives,
  - Content,
  - Methods and
  - **Tools**

*"Such tools include, for example, automatic assessment, visualization, simulation and course management tools, as well as **dedicated learning environments** or learning objects."*

Koli Calling Call for Tools for computing education

AlgoViz-project (NSF) - Cliff Shaffer

EU funding? - Ludek Kucera

Finnish network project on basic programming studies - Korhonen

- Dissemination of teaching and learning practice
- Solid, theoretically anchored research conference in computer science education
- Moderate size, intimate atmosphere, and lively discussions
- Call for Papers
- **Call for Tools**

Call for Tools: orientation & motivation

- **Engineering education research**
  - software tools to assist students' and/or teachers' work
  - research papers may describe the rationale for the new tool
  - present its functionality
  - evaluate the impact of the tool on students' learning process, learning outcomes or teacher's work
- **Tools**
  - requires a major effort
  - rarely given proper credit in scientific evaluations

Call for Tools: implementation

- **Rigorous evaluation process**
- **Presentations of accepted peer-reviewed tools**
- **Goal**
  - Merit comparable to research papers
  - High quality educational software
  - Promote research, development, and dissemination of educational tools
  - Discussions on relevant directions of future tools research

Call for Tools: 2008 (http://cs.joensuu.fi/kolistelut/tools/)

VILLE visual learning tool

PeerWise

Ask | Share | Lea

Welcome

PeerWise supports the construction, di
contributed assessment questions.

Students of a participating course deve
associated explanations and contribute
are then available to other students in t
revision purposes, critiqued and discus

JLS i
desig
comp
and functionality to commercial prod
student and instructor-friendly aspe
products such as state-machine and truth table editors, extensive error checking, and multiple simulation-result views.

BlueJ

New Class...

Compile

BlueJ 2.2.1

PatternCoder for BlueJ

Select design pattern (Step 1 of 5)

Select the desi pattern you wish to ad click next.

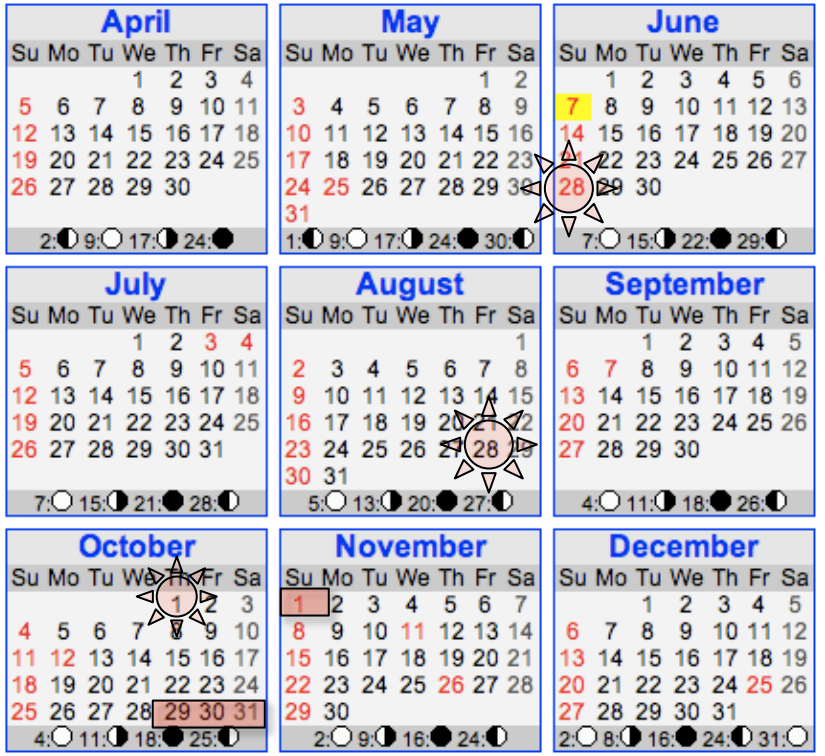
< Back Next > Cancel

PatternCoder: Award Winner!

Call for Tools: 2009

- **Submissions due June 28th 2009**
- Notification of acceptance, August 28th
- Early Registration deadline October 1st
- Registration deadline, October 30th
- **Workshop, October 29th (evening) - November 1st (lunch-time)**

Thank You!



Discussion

- **”Call for Tools” in general, i.e. In other engineering disciplines?**
- **Engineering education research**
  - Disseminating best practices vs. research?
- **Role of IEEE Nordic Education Society Chapter?**