Enduring constituents of civil engineering curricula: Educational field trips and diploma thesis

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Civil engineering curricula: 4 forces of change

- Advances in CE technology
- Changing societal demands
- Changing industry needs
- Educational good practices and advances
 - Advances in instructional technology
 - Results from research on engineering education

What should NOT change?

- Answers in terms of content (most often)
 "core" courses
- Answers in terms of educational approach?
 - NAE (2010): advanced personalized learning (what instructional technology cannot replace)
 - Geoengineering field trip
 - Diploma thesis

Geoengineering field trip



Geoengineering field trip: logistics

- Organized for the last 20 years
- 12-day long
- 200 3rd-year students
- 4 engineering geology faculty & staff + invited visitors (Medley 2010)
- 2011 cost: 750 euros per student (30-40% covered by CE School, 60-70% by sponsors)
 - 4 coaches,1 emergency coach, 1 doctor, insurance, half board accommodation



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Geoengineering field trip: Educational material & philosophy

- Educational material
 - Program & advice: student handout
 - Site information: student handout
 - Rock classification charts: instructor tool in a plasticized menu-like form
 - Field trip supporting volume (Marinos et al. 2011)
- Inductive approach to teaching and learning

Field trip supporting volume

Rock classification charts



Handout for site visits

Malpasset Dam failure (Feb. 12, 1959)



66.5 m high arch Dam, 222 m long at the crest

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NTUA at failed Malpasset Dam



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Diploma thesis

- Each student works under close supervision of a faculty member
- Work nominally performed in 10th semester
- Topics: practice-oriented, literature reviews, original research

Survey of diploma theses

- 2004-2010 data
- 1148 theses supervised by 65 CE faculty members
- 22 faculty members replied with data for 366 theses
 - 139 papers in conferences (76 in int. conf.)
 - 54 papers in journals (49 in int. journals)
 - 10 awards

Common element of the two curriculum constituents

- Research or research-like experiences
 - Research teaching debate (Prince et al. 2007)
 - Data do not substantiate the claim that research supports teaching
 - Data show educational benefits from undergraduate research
 - Questionable: bring research in classroom
 - Promising: inductive teaching emulates research

Concluding remarks

• WE ALL AGREE

Instructional technology can offer solutions to (1) logistical problems and (2) pedagogical problems

• WE MAY AGREE

Instructional technology cannot offer (as of yet) advanced personalized learning

• THESIS OF THIS PAPER

Advanced personalized learning \rightarrow enduring constituents of curricula



The NTUA geoengineering field trip in the words of a student:

"when we returned to Athens, all I needed was a shower to start the trip all over again"