Educating the Civil Engineer for the Coming Decades – A EUROPEAN PERSPECTIVE

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The views expressed in the present presentation should not be considered as the general understanding in Europe.

They belong to a group of professors conducting the “Effective Education” project of ECCE - The European Council of Civil Engineers.
OUTLINE

- About ECCE
- The perspective
- The ongoing project
  - Problem identification survey
  - Survey findings evaluation workshop
  - Foresight study
  - Expected outcome
- Concluding remark
ABOUT ECCE
European Council of Civil Engineers

- Is a semi-official European association registered in London, UK.
- Currently includes 25 member countries.
- Each represented by only one civil engineering body; association, chamber, society etc.
ABOUT ECCE

European Council of Civil Engineers

- Aims at the betterment of the civil engineering practice across Europe.
- Operates through Standing Committees coordinated by the Executive Board.
ABOUT ECCE

Standing Committees

- Professional Recognition & Mobility
- Education & Training
  (Task Force “Effective Education”)
- Knowledge & Technology
- Environment & Sustainability
- Development & Business Environment
As a young man, the speaker was a successful instructor thirty years ago.

He is doing his job much better now.

Alas, he is a total failure today. Why?
Because

- The conventional educational system does not seem to be effective any more.
- Because, it is not compatible with the changing conditions. Thus,
- Any meaningful improvement proposal has to be based on a clear understanding of the changing conditions.
CHANGING CONDITIONS

- Scope of “civil engineering”
- Student capacity & perception
- Educational tools
- Educational policies

have significantly changed in the last few decades as a result of ...
CAUSES OF CHANGE

- Unimaginable rise of the computer
- That of the Internet in particular
- Endless developments in ICT
- and many other secondary factors cited in a recent paper by the speaker...
The changing scope of civil engineering has been neatly and very wisely formulated in the ACSE Vision 2025 & its Roadmap.

No need for a single further word or perhaps a small remark...
VISION 2025 & ROADMAP

- Actions recommended by the Roadmap towards each vision are very sensible.

- Each list of actions suggests inclusion of a new subject in the CE curriculum.

- Impossible, unless a paradigm change takes place in CE education philosophy.
CHANGING STUDENT

- Object of education is twofold:
  - Information transfer and
  - Intellectual (reasoning) improvement

- Students seem to grow more reluctant to improve their reasoning capacity and more enthusiastic to store information!

What a resemblance...
Please note the resemblance:

In each consecutive computer generation,

- Memory increases exponentially, but
- Reasoning can never go beyond “IF and GO TO” logic.
- Indeed, the computer appears to have affected human perception significantly.
My students’ brains operate on the same principles as the computer does:

- They store as many solved examples (templates) as possible.
- When they get a problem, they scan through their memories. If it matches one, they are lucky. Otherwise, helpless.
CHANGING STUDENT

- Computer is a powerful tool for the old generation; it is the way to exist for the young. S/he does not exist without it.

- Engineer was the master in the old days, computer the slave; now, vice versa.
CHANGING EDUCATIONAL TOOLS

Here are a few examples:

- Blackboard is replaced by Power Point.
- Slide rule (the ingenious instrument) is replaced by Excel spread sheet.
- Engineering Drawing (a serious course) is replaced by AUTOCAD training.
CHANGING EDUCATIONAL TOOLS

- Term papers required literature survey; cut & paste from the Internet settles it.
- Copying the posted exam solution is replaced by telephone-camera shots.
- No need to ask the seniors, all the past exam solutions are available at the photocopy shop for the price of a beer.
CHANGING EDUCATIONAL TOOLS

To cut the long story short,

- Acquiring information was not easy; many things were learnt in the process.
- Now, it is easy to acquire the tools.
- Acquiring the tool is not everything. Filing the exam solution does not help, unless it is understood by hard work.
NEED FOR PARADIGM CHANGES

- Changes explained are irreversible facts.
- The present educational system should be modified on the basis of these facts.
- But cosmetic changes (in curriculum, tools, techniques etc.) are not sufficient.
- Paradigm changes are necessary. New concepts, new approaches, new definitions, new institutions are needed.
ONGOING PROJECT
OBJECTIVES

- To identify the present problems of civil engineering education, the underlying causes, the expected developments.

- To formulate alternative approaches to overcome these problems.
SCOPE

- Identification of problems of civil engineering education in participating countries with their universal and local dimensions.
- Formulation of educational techniques compatible with the changing conditions.
- Drafting a meaningful report and a feasible ECCE position paper.
METHOD

- A problem identification survey
  - Quest 1 - Faculty
  - Quest 2 - Senior students
  - Quest 3 - Practicing civil engineers
  - Quest 4 - Employers of civil engineers

- A workshop to evaluate survey findings

- A foresight study, if possible
EXPECTED OUTCOME

- A comprehensive document reporting the work and the findings
- An “ECCE position paper” presented to the national and European authorities.
CONCLUDING REMARK
Comments about the students should not be misinterpreted as a criticism.

They are a self criticism of a few old men who admit their failure to adapt their techniques to the changes.

New students are neither less bright nor less industrious than their elders. They are a different breed.
THANK YOU
for your attention...