TUNING (CIVIL) ENGINEERING: THE 2013 EU-CHINA STUDY

Giuliano AUGUSTI
President QUACING, Italia
Alfredo SOEIRO,
Universidade do Porto, Portugal

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Tuning?

Goal: **Tuning of (European) educational structures and programmes on the basis of diversity and autonomy**

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Characteristics:

Tuning of educational structures (in Europe)
Basis of diversity and autonomy
Financed by European Commission (2000)

Initial areas:

Mathematics, Business Administration, Education Sciences, History and Geology

Other areas later:

European Studies, Nursing, Physics, Chemistry and Engineering

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TUNING elaborates

GENERIC and SUBJECT-SPECIFIC COMPETENCES
KNOWLEDGE, UNDERSTANDING, SKILLS AND ABILITIES

TARGET GROUPS:
- STUDENTS,
- ACADEMIC STAFF
- HE INSTITUTIONS
- EDUCATIONAL BODIES
- PROFESSIONAL ORGANIZATIONS
- SOCIETY AS A WHOLE

WHAT ARE THE MOST IMPORTANT COMPETENCES TO BE EMPLOYABLE?

ARE THESE ACTUALY TAUGHT AND TO WHAT EXTENT?

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TUNING Cooperation initiatives

- The Socrates/Erasmus Thematic Network "Enhancing Engineering Education in Europe – E4" formed an *ad-hoc* "Tuning Synergy Group" (2003)
- AHELO (Assessment of Higher Education Learning Outcomes) project OECD (2009):
  Set of agreed Learning Outcomes based on the EUR-ACE Framework and the ABET criteria for accrediting engineering programmes

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TUNING initiatives thoughout the world

- Tuning America Latina (2004-7 and 2011-13)
  - Civil Engineering
- Tuning Russia (2010-13)
  - Environmental Engineering
- Tuning USA (2009-11)
- Tuning Canada (2011-12)
  - Engineering
- Tuning Africa (2008-10 and 2011-12)
  - Mechanical and Civil Engineering

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EU-China TUNING study (2012-2014)

- Three subject areas
  - **Education Sciences**
    - led by Beijing Normal University
  - **Business Administrattion**
    - led by Xi'an Jiao Tong University
  - **Civil Engineering**
    - led by Tongji University, Shanghai

    (European Experts: **G.Augusti, A.Soeiro**)
- **PREPARATORY MEETING:**

  Xi'An, 23-24 March 2013

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EU-China Tuning:

Opening Meeting, Xi'An, March 2013



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Objectives

- Conceptual frameworks tailored to the Chinese situation.
- Consultation surveys with sector groups and comparison with other regions of the world.
- Report with communalities and differences between the European and the Chinese HE focusing on quality enhancement and assurance and mechanisms for mutual recognition.
- Intermediate reports and final report with outcomes.

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EU-China TUNING study (2012-2014)

April-July 2013:

- Preparation of lists of Generic and Subject-specific Competences;
- consultation on these lists.

Then,

- analysis of consultation results

by TUNING experts

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Generic Competences

1. Capacity for analysis and synthesis
2. Capacity for applying knowledge in practice
3. Planning and time management
4. Basic general knowledge in the field of study
5. Grounding in basic knowledge of the profession in practice
6. Oral and written communication in your native language
7. Capacity to communicate with a second language
8. Computing skills
9. Research skills
10. Capacity to learn Actively
11. Information management skills
12. Critical and self-critical abilities
13. Capacity to adapt to new situations
14. Capacity for generating new ideas
15. Problem solving
16. Decision-making
17. Teamwork
18. Interpersonal skills
19. Leadership
20. Ability to work in an interdisciplinary team
21. Ability to communicate with non-experts in the field
22. Appreciation and understanding of culture diversity
23. Ability to work in an international context
24. Commitment to health and safety
25. Ability to work autonomously
26. Project design and management
27. Initiative and entrepreneurial spirit
28. Ethical commitment and professional attitude
29. Social responsibility and civic awareness
30. Concern for quality
31. Will to succeed
32. Environment awareness and commitment to sustainable development
33. Ability of self-management

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Civil Engineering Competences

1. Broad knowledge on the essential features, processes, history and materials of civil engineering
2. Awareness of the responsibilities of civil engineering in society
3. Ability to do original researches in civil engineering independently
4. Ability to use the modern techniques and information tools in engineering practice
5. Ability for organizing and coordinating civil engineering projects
6. Ability to communicate, collaborate and conduct engineering design/construction/management
7. Comprehensive ability and leadership on civil engineering project management
8. Sense of creative & innovation in civil engineering
9. Ability to define, determine and implement a strategy for solving a civil engineering problem and to produce a substantial report or thesis
10. Ability to deal with engineering accident and engineering risk management
11. Ability to apply the principles and methods of mechanics
12. Ability on the application of basic performance of engineering materials
13. Ability to master and apply the fundamental principles of structure analysis
14. Ability to deal with general problems in construction and organization independently
15. Knowledge for applying information technology in civil engineering.e.g. engineering software
16. Ability to design and conduct experiments, investigations, and data analysis in civil engineering
17. Ability to apply the knowledge of engineering geology to solve problems during the design and construction process
18. Ability to apply the basic principles and methods for foundation design/construction
19. Ability to apply the life-cycle design concept on engineering project
20. Capacity for observing and understanding the environment impact of engineering practices
21. Knowledge on the working principle of common engineering equipment and their development trends
22. Ability to use laws and regulations to implement engineering construction management
23. Skills relevant to all major employment sectors in civil engineering
24. Ability to read the specialty literatures in English or another foreign language
25. Understanding the basic knowledge of relevant major, such as Transportation, Urban Planning, water supply and drainage, architectural equipment and building electricity
26. Ability to express for civil engineering
27. Capacity of conceptual design in civil engineering

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WHY a CONSULTATION? (usual in TUNING projects)

- To initiate joint reflection from updated information
- To contrast first agreements with society
- To start debate
- To offer TWO levels of analysis:

  -GENERAL

  - SUBJECT AREA

3 Variables to be considered:

- **IMPORTANCE**
- **ACHIEVEMENT**

For both a scale of 1 to 4:
- 1 = none
- 2 = weak
- 3 = considerable
- 4 = strong

- **RANKING**

Data

	GENERIC COMPETENCES			
	Business	Education	Civil Engineering	Total
Academics	107	66	134	307
Employers	143	230	109	482
Students	152	138	184	474
Graduates	149	213	123	485
Total	551	647	550	1748

	SPECIFIC COMPETENCES			
	Business	Education	Civil Engineering	Total
Academics	107	61	108	276
Employers	141	196	98	435
Students	150	122	166	438
Graduates	144	188	119	451
Total	542	567	491	1600

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Data

Total number of respondents 550:

- 123 Graduates
- 109 Employers
- 134 Academics
- 184 Students

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EMPLOYERS

RATING – Importance vs. Achievement

#	Description	Importance	Achievement
2	Capacity for applying knowledge in practice	3,49	2,96
1	Capacity for analysis and synthesis	3,44	3,11
17	Teamwork	3,43	3,15
15	Problem solving	3,41	3,13
33	Ability of self-management	3,36	3,15
10	Capacity to learn Actively	3,34	3,12
29	Social responsibility and civic awareness	3,32	3,14
14	Capacity for generating new ideas	3,31	3,08
18	Interpersonal skills	3,29	3,06
30	Concern for quality	3,28	3,14
4	Basic general knowledge in the field of study	3,28	3,25
6	Oral and written communication in your native language	3,28	3,12
25	Ability to work autonomously	3,22	2,96
13	Capacity to adapt to new situations	3,20	2,94
28	Ethical commitment and professional attitude	3,20	3,10
3	Planning and time management	3,17	2,89
26	Project design and management	3,15	2,87
5	Grounding in basic knowledge of the profession in practice	3,15	2,97
27	Initiative and entrepreneurial spirit	3,13	2,83
32	Environment awareness and commitment to sustainable development	3,12	2,82
16	Decision-making	3,07	2,87
24	Commitment to health and safety	3,07	2,82
31	Will to succeed	3,04	3,10
9	Research skills	2,98	2,74
19	Leadership	2,93	2,72
12	Critical and self-critical abilities	2,92	2,78
11	Information management skills	2,91	2,82
8	Computing skills	2,85	3,10
20	Ability to work in an interdisciplinary team	2,81	2,75
23	Ability to work in an international context	2,81	2,63
7	Capacity to communicate with a second language	2,71	2,57
21	Ability to communicate with non-experts in the field	2,60	2,71
22	Appreciation and understanding of culture diversity	2,57	2,82

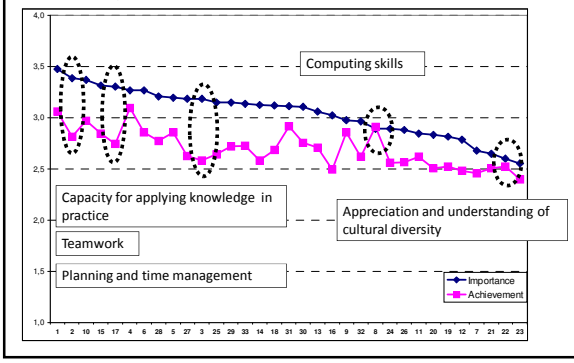
23 competences over 3

9 competence over 3

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ACADEMICS

RATING – Importance vs. Achievement



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STUDENTS

RATING – Importance vs. Achievement

#	Description	Importance	Achievement
10	Capacity to learn Actively	3,47	3,04
1	Capacity for analysis and synthesis	3,44	3,01
2	Capacity for applying knowledge in practice	3,37	2,81
15	Problem solving	3,37	2,94
18	Interpersonal skills	3,30	2,84
17	Teamwork	3,30	3,02
5	Grounding in basic knowledge of the profession in practice	3,29	2,98
29	Social responsibility and civic awareness	3,29	2,96
28	Ethical commitment and professional attitude	3,26	3,03
3	Planning and time management	3,26	2,81
33	Ability of self-management	3,25	2,83
4	Basic general knowledge in the field of study	3,22	3,06
25	Ability to work autonomously	3,22	2,84
30	Concern for quality	3,21	2,89
6	Oral and written communication in your native language	3,17	2,88
16	Decision-making	3,13	2,75
31	Will to succeed	3,13	2,91
13	Capacity to adapt to new situations	3,10	3,00
24	Commitment to health and safety	3,10	2,91
14	Capacity for generating new ideas	3,10	2,65
27	Initiative and entrepreneurial spirit	3,10	2,61
26	Project design and management	3,03	2,77
19	Leadership	3,02	2,67
32	Environment awareness and commitment to sustainable development	2,98	2,73
11	Information management skills	2,98	2,70
9	Research skills	2,97	2,75
12	Critical and self-critical abilities	2,96	2,70
20	Ability to work in an interdisciplinary team	2,94	2,49
21	Ability to communicate with non-experts in the field	2,85	2,65
23	Ability to work in an international context	2,81	2,48
8	Computing skills	2,81	2,84
7	Capacity to communicate with a second language	2,74	2,51
22	Appreciation and understanding of culture diversity	2,67	2,67

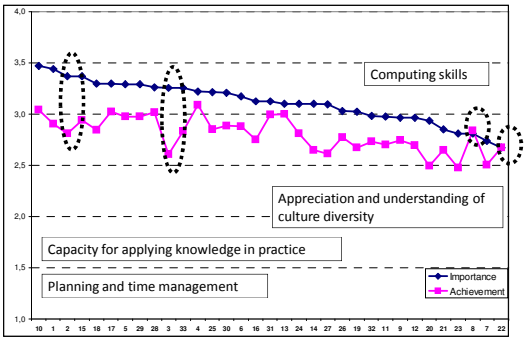
23 competences over 3

4 competences over 3

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STUDENTS

RATING – Importance vs. Achievement



EU-China TUNING study (2012-2014)

26-27 August 2013, Shanghai:
Civil Engineering Seminar

- Discussion on results of consultation;
- Critical analysis of competences lists;
- Preparation of further steps: the competences will be revised .....

(Analogous Seminars held for Education Sciences and Business)

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EU-China TUNING study (2012-2014)

Next meeting: December 2013

Topics to be discussed (draft):

- **Student Workload: the Usefulness of Workload Based Credit Systems**
- **Approaches to Learning, Teaching and Assessment**
- *Objective:* To discuss the relationship between the learning outcomes / competence approach and the approaches to teaching, learning and assessment in degree programmes and course units and to raise awareness regarding different strategies and methods for teaching, learning and assessment.
- *Expected outcome:* An overview of relevant approaches regarding teaching, learning and assessment related to the Learning Outcomes identified.
- **Design of Degree Programmes on the basis of the student-centred approach: defining programme Learning Outcomes (initial discussion)**
- **Drafting of Conceptual Framework / Meta-framework for three Subject Area Groups**

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EU-China TUNING study (2012-2014)

Third (last) meeting: March 2014

Topics to be discussed (draft)

- **Presentation of Outcomes of the three Pilot Subject Area Groups**
- **Finalizing Conceptual Frameworks / Meta-frameworks for three SAGs**
- **Quality enhancement and Quality assurance in Programme Design, Delivery and Maintenance**
- **Tools for Recognition of Studies**
- Objective: Drafting a report which identifies communalities and differences between the European and the Chinese higher education systems, to identify / design mutually acknowledged criteria for quality enhancement and assurance which will result in practical tools and mechanisms for mutual recognition of (parts of) academic studies. This should enhance mutual understanding and trust building and therefore facilitate the mobility of student, graduates and academic staff between China and the EU.
- *Expected outcome:* Report which contains practical tools and mechanisms for mutual recognition based on shared trust and confidence.

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