

# Talking about Teaching 2012 (TaT'12)

<http://dx.doi.org/10.3991/ijep.v3iS1.2494>

Maria Teresa Restivo<sup>1</sup>, Maria da Graça Rasteiro<sup>2</sup> and Alberto Cardoso<sup>2</sup>

<sup>1</sup> Universidade do Porto, Porto, Portugal

<sup>2</sup> Universidade de Coimbra, Coimbra, Portugal

The Portuguese Society for Engineering Education (SPEE) was publically launched in 2010.

Its start-up initiatives and consolidation process were complemented with the simultaneous establishment of SPEE international links.

In 2010-11 international workshops were run with the support of University of Porto (UPorto) and FEUP. Later on, in 2011, SPEE joined the International Society for Engineering Education (IGIP) and together both societies organized the SPEE-IGIP Flash Moment within the 1st World Engineering Education Flash Week.

SPEE has participated in other initiatives, such as CISTI 2011 (Chaves, Portugal), ICECE 2011 (Guimarães, Portugal), Educa Berlin 2011 (collaborating with the IGIP and SEFI workshop “The Role of Pedagogy in Online Engineering Education”), and has also organized Special Tracks in CLME 2011 (Maputo, Mozambique) and in the 41st International Conference of IGIP (Villach, Austria). Here, SPEE organized a Special Track entitled “Talking about Teaching 2012 (TaT'12)”.

In the Special Track Session TaT'12 within IGIP2012, SPEE intended to contribute to promote the discussion on Engineering Education (EE) by providing an opportunity for debating and sharing approaches, developments and experiences, in line with the mission of both SPEE and IGIP.

“Talking about Teaching” is the name of a thought-provoking column of Susan Zvacek, from Fort Hays State University, in the SPEE Newsletter and it was planned to give continuity to her reflections and to potentiate them within TaT'12 and in future TaT'xx.

The proposed topics were concerned not only with resources in EE and with the constant demand on the use of technology, but also with the effectiveness of knowledge in order to guaranty simultaneously the spirit of engineering leadership in society and the lifelong learning capability. They also included the perspective of EE oriented for STEM teachers and students, as well as the sharing of resources with developing countries.

The TaT'12 Special Track has been organized in 3 sessions. Each session had an invited speaker, regular presentations and a final group discussion on all its topics. Susan Zvacek engaged all the participants with the topic “Visualizing Understanding with Concept Maps” which motivated some interactivity. James Uhomobhi discussed “Collaboration and Resource Sharing in Engineering Education”, stressing the importance of the interaction with developing countries and Teresa Larkin spoke about “Authentic Assessment using a Research Conference Format”, showing how complementary and more effective methods can be used to supplement traditional paper and pencil examinations.

In the next paragraphs extended works based on some of the presentations of TaT'12 are summarized.

Concept Mapping for Higher Order Thinking is devoted to explore an instructional strategy to help students to improve deep knowledge structures attenuating the present impatient generation lack of focus in conceptualization processes and in concept relationships. Common knowledge needs basic concepts. However, to solve complex problems, to be critical in solutions and to innovate, it is fundamental to get the clear relationship between concepts. Very often, students show some limitation in higher order thinking. Susan Zvacek shares this work with two co-authors in an interesting international cooperation basis. A case study is set and the intervention reported. Preliminary results are presented.

Promoting Remote and Virtual Labs in Portugal: “Online labs enlarge the world capabilities in experimental activities and contribute for collaborative work using emergent technologies, bringing together students, engineers, researchers and professionals from different areas”. The work also looks at their relevance in science and technology (Sc&T) dissemination, contributing to encourage youngsters to be involved with Sc&T, in helping to attenuate the political trend to reduce student contact hours, in fostering student centered activity and in supporting new demands in lifelong learning due to the present retirement politics on population ageing as is happening in Europe. Presently, the Portuguese Consortium pt.lab2go offers resources at higher education level, for Portuguese speakers. However, in the near future it will expand capabilities for STEM and for industry in English.

Mentoring Activities in a Summer School. This paper reports a project started in 2005 of a summer school program named Junior University (UJr) at University of Porto (UPorto). It was launched to promote knowledge and higher education among young people. Another aim has been to increase student vocations in the areas of Science and Technology. This project is a successful initiative bringing to all areas of UPorto, on average, more than 5,000 pupils during July every year, more than the annual number of new students entering UPorto. The paper describes UJr, an example of a project mentoring approach at two levels, and offers more details of activities developed at the Faculty of Engineering. It also gives some figures for quantitative characterization and includes feedback from junior tutors.

Engineering, Concepts and Video Clips: The internet is the most powerful way of communication. Videos are dynamic and multi-sensorial tools able to catch the viewers' attention and to pass complex messages. Short clips prepared for conveying facts and daily life reality linked with concepts and experiments should be available for all in the internet. Like “LEGO bricks”, a clip should be easily connected with a learning topic, respecting rigor and conveying an accurate message. In the authors opinion such type of clips should illustrate the topic

relevance and stimulate curiosity to foster students' additional exploration. The work describes the concept underneath the video clip production "Earth Dam Disasters" and its test survey. The clip is available to the readers for evaluation. Results are presented, proving the stated argument.

**On-line Tools to Teach Chemical Engineering: Exploring Synergies:** synergies between complementary tools can help student understanding of different subjects. This paper describes how including in the same platform different tools ranging from e-books, simulators and videos to remote labs, can contribute to the learning process of students of different subjects in the Chemical Processes field, leading also to knowledge integration, both between theory and practice, and also transversally between complementary subjects, namely between fundamental and applied disciplines.

**Designing Service Learning Projects for Freshman Engineering Students:** a primary goal in offering a services learning project for freshman students, within a traditional Engineering curriculum, is to ensure that students understand the impact of engineering on society. This paper describes such a pilot project developed at the University of Pittsburg, focusing on the challenges of its implementation and on the benefits for the students of this type of program.

**The Evolution of Assessment within an Introductory Physics Course:** new assessment methodologies are as important as the development of new teaching strategies. Writing can be used not only to help students confront their misconceptions but also to assess student learning outcomes. This paper presents an alternative or a supplement to traditional paper and pencil examinations, using all phases of a paper writing experience for that purpose.

**Collaboration and Resource Sharing in Engineering Education:** "In present days of world globalization, institutions are not only fostering the formation of graduates able to operate in one location, but desire to produce the global engineer equipped with the right knowledge and skills, able to operate in any part of the world." This paper examines some of the resources for sharing and collaboration in engineering education, investigating the challenges and influence of on-line technologies. The influence of culture, with a focus on Africa, is addressed. The author concludes that it is fundamental that opportunities created by modern technologies be explored through sharing and collaboration for enhancing engineering education in Africa.

**Teaching for Understanding in Engineering Education.** In this paper, the authors introduce effective teaching strategies and models designed to capitalize deep understanding and critical thinking in teaching engineering, implemented at the Estonian Centre for Engineering Pedagogy at Tallinn University of Technology. Considering that "schools have typically neglected teaching for thinking, and transfer thinking operations from one subject to another and to real life", it is underlined that thinking skills and processes need to be learned and that teachers need to teach for thinking in order to guarantee an authentic way of teaching and of learning. Some strategies and models for teaching

thinking skills and capitalizing deep understanding are described and discussed.

**Web-based peer assessment: a case study with civil engineering students.** This paper presents the main results of a web-based peer-assessment case study based on the quantitative and qualitative analysis of the collected data from a questionnaire applied to civil engineering students. After the characterization of the students' activity and the description of the research methodology, the authors evaluated the activity and discussed the results in terms of the use of the Google Drive environment and the overall student's perception. They concluded that digital competencies do not represent any difficulty for the activity and identified the relevant factors underlying the students' appreciation and usefulness of the received feedback.

**A Proposal for the Description of Individual Course Units.** The paper presents a structured template to specify the several parts of a course unit description as a way to improve the course quality by fostering teacher reflection, which expands and details the data and general advice contained in the ECTS User's Guide. The authors propose further detail to each major component in the curricula (learning outcomes, readings, assessment activities, teaching and learning activities, and grading) and emphasize several alignments between the curricula components and between those and the European Qualifications Framework for Lifelong Learning document, expecting to contribute for the improvement of the courses description.

**Online Learning in Engineering Courses Using Wireless Sensor and Actuator Networks.** "Wireless Sensor and Actuator Networks (WSAN) are simultaneously a subject of interest for several engineering courses and a way to enable remote access to laboratory experimental setups." This paper describes the WSAN potential use, mainly in engineering courses and lifelong learning programs, and point out that WSAN can be a relevant, low cost and very effective infrastructure to allow interaction with remote laboratory systems for online experimentation purposes, benefiting teaching and online learning activities. The authors describe the main characteristics of the WSAN framework and present some examples of experiments promoting a new paradigm of learning and training using online experimentation.

The co-organizers of the TaT'12 wish to express their thanks to the Reviewer Board of this special track, involving its Program Committee, to the support of SPEE and IGIP Societies, to the support of IEEE Distinguished Lecturer Program and to Prof. Edmund Tovar, to the Editor-in-Chief of iJEP and, last but not the least to Prof. Michael Auer, the Managing Editor of iJEP Journal.

#### AUTHORS

**M.T. Restivo** is with Universidade do Porto, Porto, Portugal (trestivo@fe.up.pt).

**M.G. Rasteiro**, is with Universidade de Coimbra, Coimbra, Portugal (mgr@eq.uc.pt).

**A. Cardoso** is with Universidade de Coimbra, Coimbra, Portugal (alberto@dei.uc.pt).

This work was supported in part by Sociedade Portuguesa para Educação em Engenharia – SPEE. Received 26 January 2013. Published as resubmitted by the authors 28 January 2013.