

Bragança Conference Report

Innovative Topics and Teaching Methods in the Field of Chemical Technology and Engineering



Instituto Politécnico de Bragança

Bragança (Portugal)

October 10th – 14th 2016



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Introduction

The INNOCHEM Intensive Program took place in the academic building of the Polytechnic Institute of Bragança, Bragança, Portugal, from the 10th to the 14th of October. It was titled “**Innovative Topics and Teaching Methods in the Field of Chemical Technology and Engineering**”. It aimed at uniting the partners of the program to further acquire knowledge on innovative teaching methods in the chemistry field.

Organisation

The program consisted of five days comprising 5 thematic sessions and the coordination meeting. The 5 themed sessions were as follows:

- Session I – Valorisation of natural products
- Session II – e-laboratories
- Session III – Chemical product design
- Session IV – Project-based learning
- Session V – Gamification



The main program featured lectures from invited guests both from Portugal and Brazil to report their novel types of teaching methods. Two fieldtrips were carried out. One of them to the Brigantia Ecopark, a science and technology park which is focused on energy, environment and eco-construction, in which the participants could get in contact with the research facilities and the start-up companies that are based there.





A fieldtrip to the Douro region was held on the third day, which aimed to show the participants the World Heritage Site of the Douro Valley and the corresponding museum.

The conference program, list of participants, and booklet are available as annexes of this document.

Participants

The participants were professors of the various fields of Chemical Engineering and Technology from the partner institutions, namely:

- Cracow University of Technology
- Muster University of Applied Sciences
- Polytechnic Institute of Bragança
- National Graduate School of Engineering of Lille

Contents

An abstract of the presentations that took place during the Intensive Program, as well as a short CV of the speakers, are available for consultation in the booklet annex of this document.

The course started with the welcome session. It took place on Monday, the 10th of October and had the Vice-President of the Polytechnic Institute of Bragança, Professor Luís Pais and the president of the School of Technology and Management Professor Albano Alves.

The course continued with the technical sessions covering several aspects of innovative topics and teaching methods.

Isabel C.F.R. Ferreira (Polytechnic Institute of Bragança – Mountain Research Centre) – Dr. Isabel Ferreira's talk was focused on the valorisation of natural products directed to several industrial fields with particular emphasis on the food sector. An overview of new processing technologies for food products, as well as of the use of natural products as food additives alternatives was explained based on the experience of her research team (BioChem Core).



Adélio Mendes and Alexandre Ferreira (Faculty of Engineering of the University of Porto) – The two researchers from the University of Porto showed that new pedagogical and didactical approaches should be accessible and promoted in order to facilitate the acquisition of skills, competences and abilities for communication, creative and critical analysis. They provided their experience in what concerns a novel model developed to teach Chemical Engineering laboratories in a perspective of e-learning.

Alírio Rodrigues (Faculty of Engineering of the University of Porto) – Dr. Alírio showed how teaching product engineering to students can be transversal to many fields, namely in the perfume engineering. Thus, he presented the art of engineering scents and odours into perfumes, as well as all the work that goes into product design at the Laboratory of Separation and Reaction Engineering (LSRE).

Pedro Saraiva (Faculty of Sciences and Technology of the University of Coimbra) – Dr. Pedro Saraiva brought the Chemical Product Design that is lectured at the University of Coimbra by promoting creativity in solving problems and creating product prototypes. This type of teaching has become a staple, allowing the students to become better prepared for the future while reinforcing innovation and entrepreneurial skills.

Vicente Leite and José Oliveira (Polytechnic Institute of Bragança; Superior School of Technology and Management of Águeda, University of Aveiro) – Dr. José Oliveira, in coordination with Dr. Vicente Leite spoke about Project Based Learning, triggered by real-life problems. This type of learning has become a constant throughout the School of Technology and Management of Águeda. The workshop involved the participation of the attendees in various hands-on situations, in order to better understand the concepts of “learning by doing”.

Rui Pedro Lopes (Polytechnic Institute of Bragança) - Dr. Rui Pedro Lopes showed that learning could be a game. His teaching encompasses gamification, using typical elements of game playing for the students to better understand the subjects at hand. In this way he has managed to increase motivation, autonomy and improve grades.

Rogério Tavares (Federal University of Rio Grande do Sul, Brazil) – Dr. Rogério Tavares also showed the benefits of gamification in the classrooms. He brought many examples of digital games with the main theme of chemistry and biology, that can be used to improve knowledge in these areas while also being fun to play and engaging.

Evaluation

On the “final remarks” (Friday, 14th) a reflection concerning the workshop was done. By having invited guests from different backgrounds and experiences the Intensive Program allowed the participants to understand that teaching methodologies are transversal and can be applied in various areas. During the lectures, participants informally inquire the lecturers, in a very dynamic interaction, allowing the theme of the presentation to be correctly understood. A very positive feedback was given by all the participants.

Conclusions

The Intensive Program was another step in the end goal of the INNOCHEM project, to improve teaching methods in line with the Bologna process. Thus, the theme of this program, “Innovative Topics and Teaching Methods” was quite important in further deepening the knowledge of how chemistry and chemical engineering can be taught to students. The Intensive Program had 7 invited speakers on various topics, from both Portugal and Brazil belonging to various institutions, proving that teaching is becoming a more interactive task and new methodologies can aid motivation, interest and improve learning.



Annex 1: Program



Innovative topics and teaching methods in the field of Chemical Technology and Engineering

Program:

October 10th

10:30 – 11:00 – **Registration**

11:00 – 11:30 – **Welcome session**

João Sobrinho Teixeira, President of IPB

Albano Alves, President of ESTiG/IPB

Filomena Barreiro, INNOCHEM IPB coordinator

12:00 – 12:30 – IP presentation (Filomena Barreiro, ESTiG/IPB)

(Lunch time)

14:00 – 17:00 – **Session I: Valorisation of natural products**

- Valorisation of natural products: from nature to products (Isabel Ferreira, ESA/IPB)
- Visit to Brigantia EcoPark (<http://www.brigantia-ecopark.pt>) (Paulo Piloto, Executive Director of Brigantia-EcoPark)

October 11th

9:30 – 12:30 – **Session II: e-laboratories**

- Student Laboratories for Efficient Learning of Chemical Engineering (Adélio Mendes and Alexandre Ferreira, FEUP)

(Lunch time)

14:00 – 17:00 – **Session III: Chemical Product design**

- Teaching Product Engineering & Perfume Engineering (Alírio Rodrigues, FEUP)
- Chemical Product Design: flipped learning of the other side of the Chemical Engineering coin (Pedro Saraiva, FCTUC)

October 12th

9:30 – 12:30 – **Session IV: Project-based learning**

- Problem/Project Based Learning environments as contexts that foster significant learning settings (Vicente Leite, ESTiG/IPB; José Oliveira, ESTGA/UA)

(Lunch time)

14:00 – 22:00 – Visit to Douro Region and Social Dinner

October 13th

9:30 – 12:30 – **Session V: Gamification**

- Learning is almost a game, isn't it? (Rui Pedro Lopes, ESTiG/IPB)
- Teacher, I blew up the laboratory! I'm glad it was only a game... (Rogério Tavares, UFRN)

(Lunch time)

14:00 – 17:00 – Coordination Meeting/Courses modules presentation (project members)

October 14th

11:00 – 12:30 – Final remarks

