

## **Engineers' competence building for innovation**

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## **CONTEXT**

In the framework of the Innov'Ing2020 international research project, we propose a workshop for the SEFI 2016 conference to explore the links between industrial companies' innovativeness and engineers' competencies. The project Innov'Ing2020 is led by the 'Education Research Center' at ENSTA Bretagne (Brest, France) and financed by French National Research Agency (ANR). It started on the 1<sup>st</sup> of January 2015 for a period of two years involving a close collaboration with academic partners in several countries having expertise in engineering education research. The main objective of this project is to develop new and creative teaching practices for engineers in accordance with the recent tendency in the industries for innovation.

## **DISCUSSION**

In a knowledge-based society, innovation has been recognised as a key element ensuring industrial growth and evolution. For industrial companies their capacity to innovate has become a necessary condition for their survival in a fast growing market competition. The competencies of engineers strongly influence the ability of companies' to innovate. Companies are needed to employ well trained graduated engineers who are capable of taking the challenges of the new industrial era. Therefore, engineers' innovation skills have become a basically essential element for successful innovation activities in industrial companies. To fulfil this need, higher engineering education plays an important role in providing students with innovation competencies and skills in a rapidly evolving technological context [1]. The most adequate way to develop and to promote these innovation skills is to provide engineering students with them within the higher education system. However, there is a discrepancy between the challenges of fast changing innovative society and formal education performances [2]. On the one hand, we witness the acceleration of innovation life-cycle in this new digital age and there is less time for engineers to develop their new products or services. They have to make frequent adjustments to shorten innovation processes and develop skills and competencies to innovate to face up to constant changes. On the other hand, higher education institutions have difficulty keeping up with these perpetual changes. They are required not only give to their students the technical knowledge base for innovation but also the opportunity to learn innovation skills: teach them how to transform a simple idea to a concept and create a valuable innovative product or service. For this reason, they have to rethink their pedagogy in a new context of learning and teaching modified by the advance of technology and adapt it to industrial requirements [3].

## **TOPICS**

In this workshop, we will focus on the question how to answer the challenges of today's innovative society and promote engineers' competence building for innovation.

We will explore the following questions:

- Which are the key competencies and skills that engineers need for innovation?
- How higher engineering education provide them with these competencies?
- What are the new methods/practices to teach competencies for innovation?
- How could we better adapt them to industrial needs?

We would explore these questions in an international setting and confront the different points of views of participants.

## **ORGANISATION**

As introduction, we will start up with a brief warm up presentation of the discussed subject and the problematic (Cf.: Figure 1).

After that, we will have a brainstorming session with the contribution of participants about the skills and competencies needed to innovate in today's industry. As a result of this brainstorming, we will draw up a list together containing all key competencies and skills.

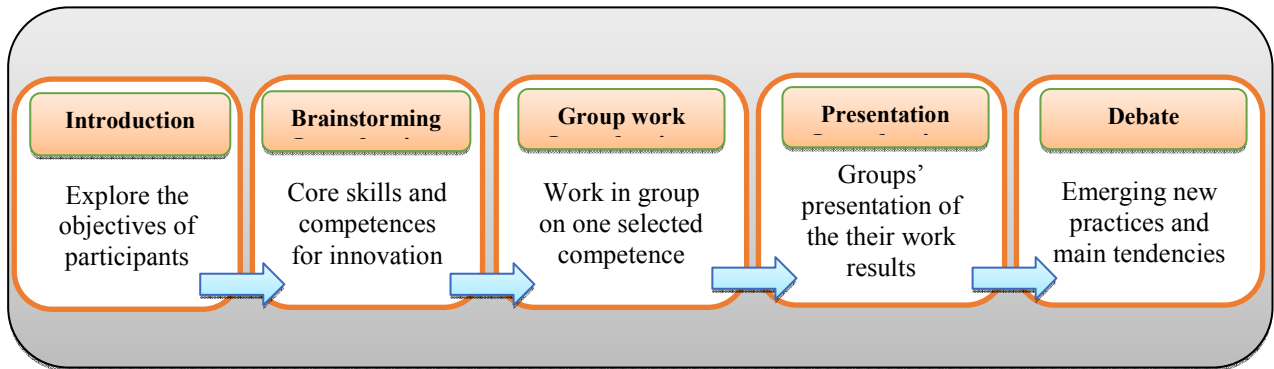


Figure 1: Workshop organisation process

In the next stage we will create small working groups and give each group one of the key competencies defined during the brainstorming session so that they could discuss about their own practices, how they implemented that competence in their teaching program/curriculum in their institutions.

Then we will ask each group to present the most interesting ideas and practices that were discussed during the working sessions. At the end of the participant group presentations, we will make a brief presentation of the results related to this subject that we obtained in our research project.

To conclude the workshop, we will generate a closing debate about these emerging practices and participant's experiences to rough out main tendencies.

## OUTPUTS

The main objective of this workshop is to give a comprehensive view on the European level on new teaching practices/methods concerning the engineer's competencies for innovation in industries. It will allow the participants to exchange their experiences and know new practices or ideas that they can later use in their institutions. For our ongoing project, it will be a good occasion for detecting new and emerging practices and trends. We hope to develop a prolific discussion during the workshop about future possibilities to improve engineer's capacity to innovate.

## REFERENCES

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