



# ALIEN

Active Learning  
In Engineering  
Education

CAPACITY BUILDING IN HIGHER EDUCATION PROJECT 586297/2017

## ABOUT ALIEN

Project ALIEN: Active Learning in Engineering Education aims at promoting Problem-Based Learning approaches in Engineering. This is an international project with partners from countries that include Greece, Portugal, the United Kingdom, Estonia, Pakistan, Vietnam, Malaysia, Cambodia, and Nepal.

The project develops an appropriate approach to Problem-Based Learning, which offers direct benefits to Engineering Education, adapted to the needs of educational institutions in countries where the consortium has partners.

The Problem-Based Learning approach will be supported through fully developed and operational labs that will be installed at partner sites in Pakistan, Vietnam, Malaysia, Cambodia, and Nepal and will be supported by well trained staff.

## OBJECTIVES

ALIEN's aim is to improve the quality of higher education by providing more motivating, stimulating, and effective learning contexts that prepare students for their professional life through the development of industry desired competences.

ALIEN implements an Active Learning context through Problem and Project-based Learning methodologies addressing real-life issues related to science, technology, engineering and math (STEM) concepts.

The methodology will be supported by a virtual learning environment that will a set of digital tools that will allow students to experiment, collaborate, and communicate in an extended and multinational learning community that will also include other stakeholders like teachers and researchers.

ALIEN's expected impact includes also the institutional strategical adoption of Active Learning as the primary pedagogical approach.

## PROBLEM-BASED LEARNING

Traditional learning methodologies based on passive transmission of information fail to allow students develop a set of competences that are required in their professional life and in their relation with the surrounding Society.



This is particularly relevant in Engineering and Technology-oriented higher education: an engineer is a professional practitioner, concerned with applying scientific knowledge and ingenuity to develop solutions for technical problems. The work of engineers forms the link between scientific discoveries and their subsequent applications to human needs through new technological solutions.

The responsibilities of the engineer may include defining problems, conducting and narrowing research, analysing criteria, finding and analysing solutions, and making decisions. Engineers must weigh different design choices on their merits and choose the solution that best matches the requirements. Their crucial and unique task is to identify, understand, and interpret the constraints on a design in order to produce a successful result.

Project and Problem-based learning (PBL) are active and learner-centred methodologies in which students develop their knowledge and competences by following a problem solving process, usually based on real-life situations. The identified benefits for engineering and technology students are considerable improvements in critical, lateral and creative thinking, problem solving strategies, intrinsic motivation, group collaboration, communication skills, entrepreneurship and integration with the society.

Supporting active learning through ICT tools (virtual social communities, games and VR/AR simulations) creates a Virtual Learning Environment (VLE) where the new technologically-savvy generation of students feels comfortable and are motivated to be active.

## RESULTS

ALIEN will produce:

- A strategic plan for the deployment of of Active Learning and Problem-Based Learning
- A pedagogical methodology that promotes Active Learning through ICT
- A Problem-based Learning laboratory in each participating University in Asia. The lab will be properly equipped and staffed. It will be a place where teachers can create and test their own problems, where they can connect to the ALIEN virtual community of teachers and researchers, and where practical sessions with students can take place
- An on-line collaborative platform that supports the production, storage, sharing, and reuse of problems and challenges to be used in Problem-based Learning. The community will allow a multinational community of researchers, teachers, and practitioners to discuss share best practices on active learning
- A set of 45 serious games and simulations and corresponding pedagogical guidelines that demonstrate Problem-based Learning scenarios. The games will be accessible through the ALIEN on-line platform
- A set of training actions motivating and preparing teachers for the implementation of Problem-based Learning



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