VIRTUAL CITY ENVIRONMENT FOR ENGINEERING PROBLEM BASED LEARNING

HTTP://ECITY-PROJECT.EU
Problem-based learning (PBL) is a learner-centered educational pedagogy in which students develop their ability to go through a problem-solving process, usually based on real-life situations. Engineering is one of the areas where PBL is a valid learning alternative and reportedly the benefits for engineering students are considerable improvements in critical, lateral and creative thinking, problem solving skills, group collaboration and communication skills. In a convergent path, games and simulations can be instantiated for learning as they involve mental and physical stimulation and develop practical skills – they force the player to decide, to choose, to define priorities, to solve problems, etc.

The main objective of the eCITY project is to design, develop and validate a pedagogical methodology, supported by an online, collaborative, city-development simulation engine (Simcity like) that stimulates the integration and continuous exploitation of Problem Based Learning in engineering schools but, at the same time, fostering the interest in Engineering in secondary school students.

The difficulty that secondary education students have with Mathematics and other Science topics is a widespread problem in Europe as stated by several international comparative studies like PISA or TIMMS. This prevents these students to follow a technical academic path like Engineering. This is not due to lesser skills of these youngsters but mostly due to wrong teaching strategies.

We cannot forget that this generation is the "net-generation" or "digital natives": they quickly absorb information in shorter chunks, they expect instant responses and feedback and they want to be active in their learning.

The main objective of the eCity project is to design, develop and validate a PBL-oriented, online, collaborative VLE platform, based on a city-development simulation engine that stimulates the integration and continuous exploitation of Problem Based Learning. The platform will be used collaboratively by students from secondary and vocational schools and higher education engineering schools.

ECity's PBL VLE is expected to be a general and stimulating context especially due to the nature and complexity of the range of problems that will be available in the virtual city. The platform will also promote a sense of belonging to a community, peer support and an additional rewarding system that includes reputation points for problem solving allowing the establishment of rankings (promoting an healthy competition); the "immortality" of the learner’s work – his/her contribution stays registered and can be accessed by all the users from the game beginnings, stimulating once more the recognition motivation mechanism.
Also important is the fact that the platform will be integrated in a clear pedagogical methodology, PBL-oriented, to ensure that the upmost relevance is given to the learning process, not the technology. Problems or challenges can be fed into the platform as homework, teamwork, curricular activities, extra-curricular competitions, big or small projects, etc. PBL can be incorporated within existing structures with little disruption as it can be implemented in a variety of forms. Therefore it is not necessary to change the curricular organization as problems can be formatted to different time and work schemes.

› **An online, collaborative, supporting simulation platform** based on the engine of a city-development simulator. This PBL environment is designed to allow an easy transfer of learning from and to other realities due to the enjoyable, dynamic play that replicates real contexts and provides practical training for very specific situations. It will be freely available during and after the project for other engineering institutions and secondary schools.

› **A set of 8 ready-available problems**, platform setups and pedagogical guides for free use. These problems will be configurable and customizable, for instance to reflect real situations in the partners cities.

› **A validated pedagogical methodology** to integrate the eCity platform that can be replicated in other engineering schools. In fact this methodology is composed by two different complementary approaches:

   On one side, it will be the engineering students themselves that will develop new challenges and problems. This way they will be directly applying the concepts learned at higher education.

   On the other side, they will be solving the set of project-developed challenges plus the new ones with the support of secondary/vocational students. By doing this they will scaffold their engineering learning but will develop other skills like leadership, group work and collaboration.

› **A motivational methodology**, to be used in secondary and vocational schools to integrate the eCity platform as a complementary activity for students to develop their interest and motivation towards engineering.