IMPROVING STUDENT CAPABILITIES THROUGH MULTI-DISCIPLINARY LEARNING- SERVICE PROJECTS

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New university context:

• Student must demonstrate generic skills
• Students must be able to cooperate with other technicians who belong to different areas of knowledge.
• Engineering has to participate in the solutions for the main social problems (climate change, energy poverty, etc.)

Goal:
This work is aimed at developing a teaching experience to foster these three capabilities in our students.
We organize a multidisciplinary project in which students from two different degrees cooperate in order to achieve a common goal.

The project follows the Learning-Service methodology, so that students perform a relevant service to society.

We pay attention to the support required by the students. So we help them to acquire the skills needed to face the project by using Project Based Learning (PBL) principles and some learning theories.
The experience consists of the next steps:

1. Specify a multidisciplinary L-S project

2. Use Project Based Learning (PBL) and learning theories to support L-S project

3. Have a first experience with a reduced number of students

4. Widen the experience to grade students

5. Create a sharing and cooperative space for different degrees
The challenge consists in monitoring the efficiency of a modern building regarding the energy consumption. The study will suggest infrastructure changes and consumption habits.

**Case Study:**
Classroom Atlantic Copper
Located in Higher Technical School of Mines and Energy

Students from Computer Science and Architecture work together
Project Articulation

"Visualize" the activities that students will have to carry out

1. Specification of the system
2. Development of wireless sensor network and data store
3. Development of building theoretical model
4. Building monitoring
5. Data analysis
6. Building simulation
7. Auditory

Project Support

We analyse weaknesses and strengths of students who are going to develop the project. Then we provide more assistance in those project phases where student have more deficiencies.

Three types of support:
- scaffolding
- modeling
- coaching

(Jonassen)
Results

Sensor network and data storage

3 Final Degree Projects in Computer Science
2 Final Degree Projects in Architecture
Results

Monitoring the classroom in two periods (Summer and Winter) and auditory

Monitoring dashboard

Variation of temperatures on different days of the week
Conclusions:

Regarding the architectural study:
• The room requires a high demand of energy
• It is highly recommended to face a thermal insulation on the facade
• Values obtained from the energy consumption are correct
• It is recommended the replacement of the heat pump by another more efficient

Related to the teaching-learning experience:
• Students demonstrated high interest and motivation.
• Opportunity to cooperate with students from other speciality
• Deployment of a real systems that allows to obtain real and useful results;
• Service provided to the society (the improvement of the energy efficiency of a public building and the contribution to face the climate change)

Future Works:

Widen this experience by applying it to larger teams of students (grade students)
Develop a cooperation framework to systematize the organization process