

Remote labs revolutionise home-learning

The current situation due to the coronavirus has turned much (or almost all) of the educational community upside down. We have had to move from a face-to-face model to a remote model in which the way to interact with our students and them with the learning resources is exclusively through the Internet.

Each teacher, at all levels (from nursery school to university), is adapting in the best possible way, giving classes in real time, recording videos, virtual resources, etc.

These tools may be sufficient for non-university or vocational education, but not for higher education, and mainly in technical disciplines such as engineering and certain training cycles, where the skills derived from the practical sessions are essential to assimilate a high percentage of the theoretical content.

Now, what tools can we offer students to continue doing practical work from home in the same way as if they were in the university's laboratories? It seems that more than ever remote laboratories are the solution or perhaps the best alternative.

Technologies to experiment with

A remote laboratory could be defined as a set of `_hardware_` and `_software_` technologies that allow the user, through the Internet, to carry out an experiment in the same way as if he was in the face-to-face laboratory.

As if it were face-to-face

In this context, the challenge for designers and developers is enormous. They must allow the user to perform the same actions as if he were in the lab, offering him tools that make the Internet his eyes and hands to interact with the equipment and the experiments. This means that he can ask questions to nature and observe (see, listen, measure) its response.

Teaching tools

In this context, the University of Deusto, through its group [WebLab-Deusto](<https://weblab.deusto.es/>), has been developing remote laboratories that can be easily exploited and used as teaching tools since 2004. To this end, our laboratories have always been designed to be accessible from any web technology or operating system and without the need to install or configure any additional software, and without communications security restrictions such as `_firewalls_`. In other words, the user only needs a device with an Internet connection, thus being able to experiment 24 hours a day, 7 days a week.

This possibility of ubiquitous connection allows the teacher during the theoretical presentations to "come" to the laboratory to demonstrate empirically and in real time the equations or mathematical models described on the board, or can investigate to reach the models, thus reducing the distance between theory and practice

When the university is closed

In addition, it offers students unlimited time to continue accessing the lab when the university facilities are closed. As the director of the Microsystems Technologies laboratories at MIT, Jesús del Álamo, said, "if the student does not go to the laboratory, the laboratory goes to the student".

This ease of access and availability has made it possible for many high schools and colleges to come to us in recent years to learn about and use remote laboratories.

The great Labsland tool

From here we want to share and offer these resources to the entire educational community **completely free of charge** through [Labsland](<http://labsland.com/>), a *_start-up_* created as a *_spin-off_* of the University of Deusto, and which through its website concentrates the largest number of active and available remote laboratories today.

Since the beginning of the confinement, Deusto's engineering students have accumulated more than 10,000 accesses to the network, in addition to the more than 30,000 accesses made by nearly 2,500 students from other educational centres, not only in Spain, but also in Germany, the United States, Poland, Portugal, Jordan, India, Malaysia and Colombia, for example. **Moreover, we would like African universities, through their engineering faculties be part of this community.**

The development of events and future prospects indicate that the use of remote laboratories is going to become an innovative present day teaching tool that teachers must learn to use and integrate into their classes. One more opportunity to improve and democratize access to science.