

THE NEXT STEP FOR E-LEARNING: SCIENCE EXPERIMENTS ONLINE

Learning online, or e-learning, has opened up an exciting new way to deliver training and education to more people, when they want it. The FORGE project wants to push e-learning into new territory by developing a way to conduct scientific experiments online in an open format using FIRE facilities.



EU countries spend an average of around 6% of gross domestic product (2009 figures) on education. With public budgets under pressure in some countries, e-learning could provide a cost-effective alternative.

Techniques for e-learning are already quite developed. Information and communications technologies ICT have allowed educators to create a wide range of e-learning methods, varying from one-way assisted-learning systems to highly dynamic and interactive platforms. And online learning has become an important component of informal and formal education, whether for personal interest, at work, or to attain a certificate from an established provider.

One way to encourage its further evolution is to provide e-learning facilities for scientific experiments. Achieving this goal requires two main components: the ability to conduct remote test bed experiments and online platforms capable of interacting with those test beds.

FORGE aims to bring these two components together by leveraging FIRE's experimentation facilities for the development of e-learning materials. The FORGE team will

also build a framework where teaching and educational materials, tools and experiments become available to educators and students through open scheme policies.

TO LEARN, TO EXPERIMENT

The ability to conduct experiments is key to learning, especially in the engineering field. However, conducting an experiment is often expensive, difficult to do, and may require specific guidance during the process so as to avoid mistakes or injuries to the experimenter.

Simulation can sometimes replace physical experimentation for some engineering topics. However in most areas, physical experiments are mandatory. Physical experiments allow engineering students to fully understand design procedures, practical limitations and trade-offs.

In this sense, both physical experimentation and simulation can contribute to engineering education and be integrated on the same computer-based platform. Laboratories can provide remote access to experiments and can allow students to access experiments without time and location restrictions, providing the necessary guidance and constraining operation in order to avoid setup integrity issues.

The remote laboratory concept provides a means to sustain a learner-centric teaching approach as experiments can be available all the time.

Thus the FORGE framework will allow educators and learners access to FIRE's high-performance test bed facilities for conducting

scientific experiments. These facilities cover a wide range of different domains belonging to the Future Internet ecosystem, such as cloud computing platforms, wireless and sensor network test beds, software defined networking and OpenFlow facilities, the infrastructure for high-performance computing, long-term evolution (LTE) test beds, and smart cities.

