Remote Labs: 360 Degrees View

Javier García Zubía
University of Deusto, Bilbao (Spain)
24th February 2016
Outline of the 360 Degrees View

Who are the stakeholders?
University of Deusto
Outline of the 360 Degrees View

• From the historical point of view.
• From the people point of view (technicians, researchers, users, ...).
• From the companies point of view.
• From the projects point of view.
• From the stakeholders point of view.
• From U. Deusto point of view.
From the historical point of view

- What happens with the classical platforms? iLAB, Labshare, LiLa, VISIR, UNED, NetLab, WebLab-Deusto...
From the historical point of view

• What happens with the classical platforms? iLAB, Labshare, LiLa, VISIR, UNED, NetLab, WebLab-Deusto...

• Is the difference between virtual and remote labs clear? Not yet? Why?
FROM THE PROJECTS POINT OF VIEW
From the projects point of view

- What do we need? **Projects** and results.
- Current projects:
  - NeReLa: [http://www.nerela.kg.ac.rs/](http://www.nerela.kg.ac.rs/)
  - VISIR+:
  - MECA: [http://www.ieec.uned.es/proyectos.htm](http://www.ieec.uned.es/proyectos.htm)
  - TATU, smart labs?: [https://tatu.cuas.at/](https://tatu.cuas.at/)
  - Go-Lab: [www.go-lab-project.eu](http://www.go-lab-project.eu)
From the projects point of view

- [https://www.google.com/maps/d/edit?hl=es&hl=es&authuser=0&mid=zelWx1GNXDIY.kQ4JhOwX-q2o](https://www.google.com/maps/d/edit?hl=es&hl=es&authuser=0&mid=zelWx1GNXDIY.kQ4JhOwX-q2o)
From the projects point of view

- Active research web pages in remote labs
- UNILabs: [http://unilabs.dia.uned.es/](http://unilabs.dia.uned.es/)
- Lab2go: [http://www.lab2go.nl/](http://www.lab2go.nl/)
- WebLab-Deusto: [www.weblab.deusto.es](http://www.weblab.deusto.es)
- LiLa: [http://www.lila-project.org/](http://www.lila-project.org/)
- RCL: [http://rcl-munich.informatik.unibw-muenchen.de/](http://rcl-munich.informatik.unibw-muenchen.de/)
- Relle/relax: [http://relle.ufsc.br/labs/1](http://relle.ufsc.br/labs/1)
Remote labs in Go-Lab project

- Biology: 1
- Physics: 16
- Chemistry: 4
- Astronomy: 1
- Electronics: 17
- Nature: 1

Lab types
- Virtual lab (193)
- Remote lab (44)
- Data set (17)
FROM THE TECHNICIANS POINT OF VIEW
From the technicians point of view

• What are now the main challenges?
• Future:
• Technology: federation, escalability, reliability, hybrids labs, smart labs, thin labs & IoT, collaborative labs, authoring tools, security
From the technicians point of view

• What are now the main challenges?
• Future:
• Technology: federation, escalability, reliability, hybrids labs, smart labs, thin labs & IoT, collaborative labs, authoring tools, security
• Pedagogy: learning effect, learning analytics, deployment in schools/universities, non formal learning, industry
From the technicians point of view

• What are now the main challenges?
• Future:
• Technology: federation, escalability, reliability, hybrids labs, smart labs, thin labs & IoT, collaborative labs, authoring tools, security
• Pedagogy: learning effect, learning analytics, deployment in schools/universities, non formal learning,
• User experience: engagement, interface, tutoring, automatic assessment, haptic devices,
From the technicians point of view

• What are now the main challenges?

• Future:

• Technology: federation, escalability, reliability, hybrids labs, smart labs, thin labs & IoT, collaborative labs, authoring tools, security

• Pedagogy: learning effect, learning analytics, deployment in schools/universities, non formal learning, industry

• User experience: engagement, interface, tutoring, automatic assessment

• Deployment: stakeholders, secondary schools, industry
From the technicians point of view

- What are now the main challenges?
- Future:
  - Technology: federation, escalability, reliability, hybrids labs, smart labs, thin labs & IoT, collaborative labs, authoring tools, security
  - Pedagogy: learning effect, learning analytics, deployment in schools/universities, non formal learning, industry
  - User experience: engagement, interface, tutoring, automatic assessment
  - Deployment: stakeholders, secondary schools
  - Industry: in-company training, demonstrations, upgrade..
From the technicians point of view

- Or still are we in the past? Java, security.....

### User and System Requirements

Please note that the settings provided below are specific for the UTS remote labs.

<table>
<thead>
<tr>
<th>Operating system</th>
<th>Browser (tested and supported)</th>
<th>Plugins</th>
<th>Screen Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 7+</td>
<td>Mozilla Firefox 3.6+</td>
<td>Java 7 (latest update)</td>
<td>1024x768 and above</td>
</tr>
<tr>
<td>Mac OS 10.6+</td>
<td>Chrome (latest version)</td>
<td>Adobe Flash 10+</td>
<td></td>
</tr>
<tr>
<td>Linux</td>
<td>Internet Explorer 9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apple Safari</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**System requirements for remote start of the experiment:**

- internet [BROWSER](#) with JavaScript and CSS (tested min. version: IE 5, Firefox 3.0, Opera 9.6, ...)
- your internet browser MUST support [AJAX](#) (PC browsers are OK, but be careful for some SmartPhones)
- enable JavaScript in your Internet browser  [INSTRUCTIONS](#)

---

**Important:** Please use Firefox.

In order to experience Labster, you need to use the Firefox browser.

Please switch to the Firefox browser (or download it for free here) and then visit this page again. Within a few months, all browsers will be supported.

---

**CZ**

**PŘIPRAVUJEME NOVÉ PC!**

Bohužel, pro spuštění úlohy zatím nemáme přesný termín výkonů a povinností.

Sledujte aktuální stav na našem FACEBOOKu: [Remote-Lab](#)

---

**EN**

**COMING SOON NEW PC**

Unfortunately, we do not know yet the exact date for (we have different workloads and responsibilities).

Watch the current status on our FACEBOOK: [Remote-Lab](#)
FROM THE RESEARCHERS POINT OF VIEW
From the researchers point of view

• What do we need? Projects and results.
• In Spain we have the “sexenio” (six-year).
• Web of Science. Impact Factor.
• Journals? IEEE: ToE, TIE, TII, TLT, more? C&E, JEE. Expat, REV and iJOE!!
From the researchers point of view

• What do we need? Projects and results.
• In Spain we have the “sexenio” (six-year).
• Web of Science. Impact Factor.
• Journals? IEEE: ToE, TIE, TII, TLT, more? C&E, JEE. Expat, REV and iJOE!!
• iJOE: around 700 papers → 400 with RL. In 2015: around 100 papers → 20 with RL.
From the researchers point of view

The Bibliographic Reference Collection GRC2014 for the Online Laboratory Research Community

From the researchers point of view

Fig. 5. GRC2014 – Distribution of coauthors per paper
From the researchers point of view


• Books:

[LIBRO] Advances on remote laboratories and e-learning experiences
L Gomes, JG Zubia - 2008 - books.google.com
... SECTION IV Remote labs in use Teaching, Learning, and Remote Laboratories, Luis Gomes, Fernando Coito ... SECTION V New challenges A Configurable Remote Laboratory for the Flexible Setup of ... Toolkit for Distributed Online-Lab Grids, Michael E. Auer, Andreas Pester ...
Citado por 94 Artículos relacionados Las 13 versiones Citar Guardar

[LIBRO] Using remote labs in education: two little ducks in remote experimentation
JG Zubia, GR Alves - 2012 - books.google.com
... SECTION 5 Remote Lab Architectures & Architects Towards a Better Deployment of Remote Laboratories in Under-graduate Engineering Education, Mohamed Tawfik ... UTS Remote Labs, Labshare, and the Sahara Architecture, David Lowe, Tania Machet, Thorsten Kostulski ...
Citado por 78 Artículos relacionados Las 7 versiones Citar Guardar

[LIBRO] Lab on the web: Running real electronics experiments via the internet
TA Fjeldly, MS Shur - 2003 - books.google.com
... systems and applications emerging from those pioneering activities are reviewed in this book. In fact, the independent nucleation of such activities has resulted in an interesting diversity of system solutions. In Chapter I. the remote laboratory installations AIM-Lab (RPI) and LAB ...
Citado por 69 Artículos relacionados Las 2 versiones Citar Guardar Más

AKM Azad - 2011 - books.google.com
... chapter goes one step beyond the typical scenario of Web-based labs in engineering ... Technology (BTH), Sweden, is a platform for opening instructional laboratories for remote access 24 ... In VISIR laboratories, students perform physical experiments and laboratory work remotely. ...
Citado por 49 Artículos relacionados Las 4 versiones Citar Guardar
From the researchers point of view

- Books:

  Online Experimentation: Emerging Technologies and IoT

  Maria Teresa Restivo
  Alberto Cardoso
  António Mendes Lopes

  7) Second book on remote laboratories: After the success of first book, started to work on a second edited book on remote laboratories. Currently received the proposal review report from the Springer and is now working to submit an updated proposal. As proposed the book will have five sections: State of the Art and Future Developments, Mobile Learning with Online Labs, Pedagogy of Online Experimentation, Online Labs: Case Studies from Educational Practice, and Commercial Online Labs and Tools. Call for chapters will be circulated in due course. Editors: Abul K.M.

REMOTE LABORATORIES in research based education of real world

Miroslava Ožvoldová
František Schauer
FROM THE STAKEHOLDERS POINT OF VIEW
From the stakeholders point of view

- Who are the stakeholders of the remote labs?
- Institutions?
- Schools?
- Teachers?
- Students?
- (researchers?)
From the stakeholders point of view

- Who are the stakeholders of the remote labs?
- **Institutions**?
- Schools?
- Teachers?
- Students?
- (researchers?)
From the stakeholders point of view

• If there are online official degrees/masters (only) using remote labs, should the administration approve them?
• Why? Evidences? Competences?
From the stakeholders point of view

- Evidences with VISIR: Garcia-Zubia et al (Deusto)
From the stakeholders point of view

- Evidences with VISIR: Marques et al (ISEP, Porto)

Fig. 7. Case S2: learning gain results in lab competence

Fig. 8. Case S3: normalized distribution of student results in the lab component.
From the stakeholders point of view

• Evidences with VISIR: Alves et al (ISEP, Porto)

*Figure 9: Students’ perception of the different learning environments importance*

Although students assumed preferring hands-on lab and calculus classes as learning environments, they also identify less positive aspects related to these environments. In fact these environments were not where they performed better. Students were more at ease in simulation environment than in the remote lab........ Unfortunately the majority of students did not understand this (or considered that it was too much difficult) and gave up.
From the stakeholders point of view

- Evidences with Labs: James R. Brinson, AMU

Learning outcome achievement in non-traditional (virtual and remote) versus traditional (hands-on) laboratories: A review of the empirical research

Figure 1. Learning outcome achievement in NTL and TL.
From the stakeholders point of view

• Evidences with Labs: James R. Brinson, AMU (USA)

Abstract
This review presents the first attempt to synthesize recent (post-2005) empirical studies that focus on directly comparing learning outcome achievement using traditional lab (TL; hands-on) and non-traditional lab (NTL; virtual and remote) participants as experimental groups. Findings suggest that most studies reviewed (n = 50, 89%) demonstrate student learning outcome achievement is equal or higher in NTL versus TL across all learning outcome categories (knowledge and understanding, inquiry skills, practical skills, perception, analytical skills, and social and scientific communication), though the majority of studies (n = 53, 95%) focused on outcomes related to content knowledge, with most studies (n = 40, 71%) employing quizzes and tests as the assessment instrument. Scientific inquiry skills was the least assessed learning objective (n = 4, 7%), and lab reports/written assignments (n = 5, 9%) and practical exams (n = 5, 9%) were the least common assessment instrument. The results of this review raise several important concerns and questions to be addressed by future research.
From the stakeholders point of view

• Evidences with Labs: James R. Brinson, AMU

If an institution is offering postsecondary education through distance or correspondence education to students in a State in which it is not physically located, the institution must meet any State requirements for it to be legally offering postsecondary distance or correspondence education in that State. We are further providing that an institution must be able to document upon request by the Department that it has the applicable State approval. (Amendments to the Higher Education Act, 2010, 34 C.F.R. §600.9)

The need for research related to the effectiveness of non-traditional learning environments, including the NTL, is being recognized by both educators and policy makers. The United States Department of Education stated in a recent report that —policy-makers and practitioners want to know about the effectiveness of Internet-based, interactive online learning approaches and need information about the conditions under which online learning is effective
FROM THE COMPANIES
POINT OF VIEW
From the companies' point of view

- What companies: iLAB? Labshare?
From the companies point of view

- Showcase of remote experiments
- Up to now we have built 18 remote experiments on secondary school and university level, which we freely offer you to use in your school projects, education and also in free time activities.
- Traditional commercial laboratory device Franck-Hertz experiment by corporation Phywe (left), which is used in remote experiment with **iSES Remote Lab SDK** (right)

![Image: Traditional commercial laboratory device Franck-Hertz experiment by corporation Phywe (left), which is used in remote experiment with iSES Remote Lab SDK (right)]
From the companies point of view

• [www.remotelabs.in](http://www.remotelabs.in)
From the companies point of view

- https://www.labster.com/
From the companies point of view

- [https://remotelaboratory.com/services](https://remotelaboratory.com/services/)

**Services**

**Consulting Services**

We provide both on-site and off-site consulting for organisations who are interested in online learning technologies.

Examples of areas where we can assist:

- General information
- Design and construction of remote laboratories
- Recommendations for enabling technologies
- Creation of educational material such as course notes and relevant lab tasks
- Training for support staff and academics in the use of remote laboratories

**Online Information**

We are continually adding new online material. Clients receive access to the following online information:

- Remote Laboratory Design Guides
- Technology Guides and Reviews
- Academic Papers and Research
- Industry News
From the companies point of view

- www.labsland.com
FROM THE WEBLAB-DEUSTO POINT OF VIEW
From Deusto point of view

• What are we doing now in WebLab-Deusto?
• RLMS
• VISIR
• Standards
• Embedded systems
• Hybrid remote labs
• Learning analytics and automatic assessment
• Schools
Questions?
Remote Labs: 360 Degrees View

Javier García Zubía
University of Deusto, Bilbao (Spain)
24th February 2016