

# Tools for e-Learning and e-Assessment: Glorep and EOL

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## **Editors:**

**Noelia Faginas Lago**

University of Perugia, [noelia.faginaslago@unipg.it](mailto:noelia.faginaslago@unipg.it)

**Osvaldo Gervasi**

University of Perugia, [osvaldo.gervasi@unipg.it](mailto:osvaldo.gervasi@unipg.it)

**Antonio Laganà**

University of Perugia, [antonio.lagana@unipg.it](mailto:antonio.lagana@unipg.it)

**Sergio Tasso**

University of Perugia, [sergio.tasso@unipg.it](mailto:sergio.tasso@unipg.it)

**Evangelia Varella**

University of Tessaloniki, [varella@chem.auth.gr](mailto:varella@chem.auth.gr)

# Preface: from EchemTest® to EchemTest<sup>+</sup>

## Present implementation of EchemTest

The European Chemistry Thematic Network ECTN Association (<http://ectn-assoc.cpe.fr/echemtest/default.htm>) has worked out in the last twenty years a core chemistry European Syllabus. Out of the syllabus ECTN has created a set of several thousand Questions and Answers (Q&A) named EchemTest® and associated with the different levels of chemistry knowledge. EchemTest® is the reference e-learning product of the Association and its libraries are regularly used for Academic purposes (guidance of students' curricula, evaluation of students' preparation, assignment of ECTS credits, etc.) by a large number of the ECTN member Institutions to the end of carrying out Self Evaluation Sessions (SES)s for school, EuroBachelor® and Euromaster® students.

The EchemTest® project is run by the ECTN Virtual Education Community (VEC) Standing Committee (SC). The VEC SC takes care (either directly or through third parties) of:

- managing of the EChemTest® central platform, coordinating the National Test Centres (NTC)s,
- maintaining and extending the English version of the Q&A Libraries and related e-testing software,
- creating and running centrally the SESs,
- developing the evaluation metrics
- producing related general statistics, centrally advertising and communicating project activities.

At national level the EchemTest® project is presently supported by 11 National Test Centres (NTC)s accredited by the VEC SC. The NTCs handle (either directly or through third parties) the accreditation of the ATSS (Accredited Test Site)s, the translation from English into national language and the maintenance of the Q&A libraries, the management of the network of national ATSS, the development of national metrics, production of national statistics, the national advertisement and communication

At local level the EchemTest® project is presently articulated into 16 ATSS (usually NTCs act also as ATS), accredited by the related NTCs. The ATSS handle (either directly or through third parties) the secure delivering of SESs, the production of related reporting, local advertisement and communication. In order to act as ATS member institutions need to be accredited by the VEC SC after participating to a Training event.

## EchemTest<sup>+</sup>

As deliberated by the Association Administrative Council (AC) of April 26, 2015 in Ljubljana, the reorganization of EchemTest® to the end of achieving financial sustainability in the absence of Thematic Network funding is a key objective of the VEC SC. This objective is pursued in **Echemtest<sup>+</sup>**, project aiming at activating, in parallel with the existing Academic EchemTest® SESs, the paid ones offered to private individuals and company employees. This will foster a gradual replacement of the cost covering mechanisms based on Network funds and possibly pay for the full maintenance and further evolution of the EchemTest®.

Partners of **Echemtest<sup>+</sup>** are the ECTN member Institutions (possibly bearing at least one Eurolabel) committed to carry out at least one of the following activities:

- use EchemTest® for teaching and assessing activities,
- contribute to the development and translation of the Q&A libraries,
- act as NTC and/or ATS,

- contribute to the development of support material and related software tools.

Partnership is obtained by applying to the VEC SC and subsequently signing related MoU.

## Business Plan

As from the VEC SC business plan approved by the ECTN AC on April 26, 2015, EchemTest® is the main ECTN asset (conservatively estimated to be worth about 2 Meur) of the Association. Its operation costs (worth about 170 keur per year) are at present met in money for about 40 keur (25% of the total operating costs) and by in kind and voluntary work (for the remaining 75%) both provided by the member Institutions through VEC SC, NTCs and ATSS. Accordingly, the business plan of **Echemtest**<sup>+</sup> for the next three years will have to enter an increasing annual income able to match the expected costs of 40 keur a year (an average of approximately 4 keur per NTC) thanks to an expected integration from projects and/or the Association. In order to achieve this, the ECTN AC has adopted (similarly to what has been done for the Label Committee) the National (or regional) Agency model whose prototype has been already approved by the ECTN AC on April 26, 2015 and recently modified on August 28. Agencies will act as ATSS (using their own or other ECTN members' infrastructures) for paid SESs. This model allows to deal nationally with SESs and to award EchemTest® certificates to private individuals and company employees. Incomes generated in this way can be used for the previously mentioned budgetary integration and to fund research based education projects of the **EchemTest**<sup>+</sup> member Institutions.

## EOL

It has to be pointed out here, however, that the adoption of an EchemTest® line for private individuals and company employees implies the implementation of the new e-testing software EOL (Exams on line) on which some ECTN member Institutions have been working since long. To this end, EOL (an e-testing Open Source software designed and developed by the University of Perugia) has the advantage of being of free use (no fees have to be paid, no limits are set for the number of users and SeSs, compatibility with the popular Moodle educational software is provided, etc.). On the other hand, the presently used e-test software Question Mark – Perception (QM) makes use of proprietary tools preventing an easy to reuse of EchemTest® Q&As. Opting out of QM is made even more impellent by the fact that the introduction of a new release of QM (that would require a complete reinstallation of the EchemTest® Q&A) and the associate adoption of an externalized server (that would weaken the exclusive property of the Q&As by ECTN) will create further difficulties to ECTN. On the contrary, the effort required to export EchemTest® Q&A to EOL will correspond to a (una tantum) extra cost (of the order of 5 thousand euro) to be met either as voluntary work or by external funding and will also the exploitation of the reusing of Moodle Q&A libraries.

## Support Material

Once reached the above mentioned consolidation (hopefully before the end of the planned 3 years) additional actions will be taken for the improvement of EchemTest® (continuous extension and revision of the Q&A libraries, their finalization to more professional use, the implementation of other Q&A libraries, training for ATCs operators, the utilization and development of supplementary GLOREP learning objects). Although a quantification of these items is at present premature the success of **EchemTest**<sup>+</sup> and the extend adoption of EchemTest® as European standard for the evaluation of Chemistry knowledge will critically depend on the proper planning of this second phase of the business plan.

*Prof. Antonio Laganà & Dr. Noelia Faginas-Lago*

## **Towards Open Source tests**

Electronic tests are a tool widely used for evaluating or self-evaluating knowledge and skills in specific themes at various levels. Challenges in the development of electronic tests involve both contents and software, since the former should address an audience as global as possible, while questions should bear the most adequate format.

In this frame, the European Chemistry Thematic Network compiled electronic tests covering all chemistry-related topics common in European high schools and universities, and addressing through large question banks all persons asking to be assessed. For more than fifteen years, a commercial software responding to most requirements set by the tests has been used for their implementation in the European Union and the Russian Federation. Thus, thousands of school pupils and university students evaluated on-line their competences in chemistry in a number of languages.

The consolidation of contents, as well as the need for further dissemination of the tests, led to the necessity of developing a proper non-commercial software fully adapted to the wishes of content developers and examinees. Developing the EOL software has been an assiduous task, undertaken by the University of Perugia with the support of Aristotle University of Thessaloniki.

After all these years of systematic testing activities, the tests have now reached their completion with the implementation of the specially designed software EOL. As a chemistry university teacher and past president of the European Chemistry Thematic Network, I would like to express my deep gratitude to the EOL team for presenting the electronic tests on chemistry-related topics with the possibility of benefiting from a user-friendly, state-of-the-art software, developed for the tests.

*Prof. Evangelia Varella*

## Programme

### Session 1 (Sept 14 afternoon) Dept. of Mathematics and Computer Science, room C3

14:00-15:00	A. Laganà - The use of EchemTest® in the post-EC <sub>2</sub> E <sub>2</sub> N <sub>2</sub> regime (no thematic network funds)
15:00-16:00	C. Manuali - Synchronize the technical management of EchemTest® by NTCs and ATSS
16:00-16:30	Break
16:30-17:30	N. Faginas Lago – Management of Self evaluation Sessions for ATS and NTC
17:30-18:30	S. Tasso – Auxiliary EchemTest® Learning Objects and related distributed repositories of GLOREP
18:30-19:00	A. Laganà – Towards the implementation of EchemTest® certificates
21:00-23:00	Dinner

### Session 2 (Sept 15 morning) Dept. of Mathematics and Computer Science, room C3

08:30-09:30	O. Gervasi - EOL: an open source software for certification
09:30-13:30	O. Gervasi and collaborators: hands on EOL demos and import of libraries
13:30	Dispersal.

## Participants

Name	Email
Tesser Riccardo	riccardo.tesser@unina.it
Ceotto Michele	michele.ceotto@unimi.it
Mavelli Fabio	fabio.mavelli@uniba.it
Bodo Enrico	enrico.bodo@uniroma1.it
Rui Marina	rui.marina@gmail.com
Brower Natasa	natasa.brouwer@uva.nl
Wahala Kristiina	kristiina.wahala@helsinki.fi
Lainez Alfredo	alfredo.lainez@quim.ucm.es
Elena Koliarmou	ekoliarm@chem.auth.gr
Kozaris Ioannis	ikozaris@chem.auth.gr
Gartner Peter	peter.gaertner@tuwien.ac.at
Szczeponek Krzysztof	szczepo@chemia.uj.edu.pl
Krebbs Heinz	heinz@chemit.at
Vagapov Bulat	boulat88@gmail.com
Roberta Selvaggi	roberta.selvaggi@unipg.it







**GLOREP**  
**SKILLED USER'S GUIDE**

## Introduction

A key mission of the Virtual Education Community (VEC) standing committee of the European Chemistry Thematic Network (ECTN) Association is to improve the quality of e-learning in Europe.

To this end, significant efforts have been paid by the various working groups of ECTN to work out of the so called Core Chemistry the libraries for self evaluation electronic tests (EChemTest).

To support the use of EChemtest and related teaching, further efforts have been paid, mainly by the ECTN members of the University of Perugia, to the end of developing a distributed repository of Learning Objects (LOs) which are e-learning self consistent, reusable, continuously improvable modules.

In particular, the policy of the ECTN VEC is that of building up a Chemistry Molecular and Materials Sciences and Technologies (CMMST) distributed repository of LOs by utilizing the technologies adopted by the European Grid Infrastructure (EGI) in terms of networking and distributed synergistic computing.

On the contrary, although in the last couple of decades the adoption of e-learning has greatly enhanced the possibility of enriching teaching in university courses with multimedia supports ranging from simple electronic tests and slides to heavy computer simulations designed in collaboration with other people, most of the materials in use are single man creatures. As a result, their dissemination is in general limited and their survival beyond the author's active life is unlikely.

To find a remedy for that, the ECTN VEC is pursuing the goal of developing a tool, named GLOREP, enabling the shared preservation, classification and improvement of the educational material produced by members.

In the present context, we propose GLOREP also as auxiliary e-learning tool for EOL e-assessment platform

This guide reports both how to build a LO and how to manage it in the GLOREP environment.

## How to build a Learning Object for GLOREP

The construction of a learning object (LO) requires special attention, because it is an object with content, context, and learning purpose.

The realization and the re-usability of learning objects made them the most important contents in a repository and ones of the most important tool of training, especially when used along with the most comprehensive educational activities that make them better accessible, reusable and effective.

A LO must be an active object, able to integrate itself with more complex contents and to communicate with the system at different times and to exchange information on their characteristics and usability. In particular, being a learning object and not whatever content object, it must take into account the “learning” and then to respond to an educational objective.

So for constructing it, we have to take into account its structure, features, sequencing and possible recycling.

How big should be a learning object? The question remains under discretion, because there are no precise shared rules.

The more complex contents are broken down into individual units, self-contained and designed to be used in multiple contexts, in order to form a repository of learning objects immediately available.

A LO, as the primary object of the GLOREP system, is a single unit of learning, self-consistent, which could be equivalent to a single lesson (2/4 hours) belonging to a teaching block, which is also self-consistent, of 1 European credit ECTS (6/8 hours). For this purpose you have to think that the keywords of the LO are contained in the keywords of the teaching block.

We can assume various types of teaching strategies, but the main ones that directly affects learning objects can be divided into six main categories:

- Tutorial and video tutorial
- Case of Study
- Simulation
- Problem solving
- Survey
- Summary

This pattern of the contents of a LO can help us to construct it.

We can subdivide the main steps for the construction of the LO in:

1. Design: definition of the aims and objectives of the LO. Analysis of both content and structural aspects and technology.
2. Structuring: definition of cognitive context, production and content aggregation.
3. Implementation: formatting of content depending on the used technology,
4. Verification: monitoring and review of the content and the quality of teaching.
5. Experimentation: assessment validity and effectiveness.
6. Normalization: actual use of the LO.

If necessary, you can restart from one of the phases listed above, if something needs to be corrected.

# GLOREP

GLOREP (Grid Learning Object REPOSITORY) is a federation of Learning Object Distributed Repositories.

GLOREP consists of:

- A set of servers, each one bearing a Content Management System (Drupal)
- A set of clients requiring the services offered by the servers
- A network (Internet) connecting the servers and allowing clients to use the available facilities after authentication.

The main user's operations are:

- Access to a GLOREP web server
- Add Learning Objects to GLOREP
- Search Learning Objects in GLOREP
- Download Learning Objects from GLOREP.

## Access to a GLOREP site

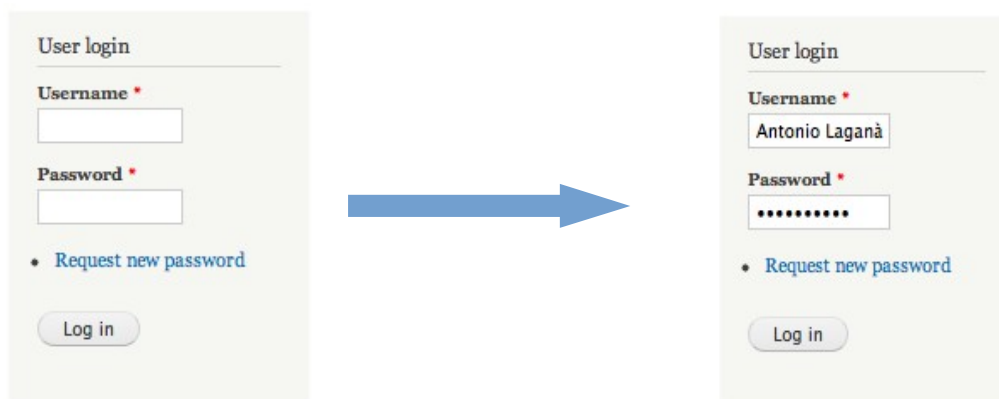
The GLOREP federation is accessible from any one of its federated servers. We suggest the system administrators to use this pattern: <http://glorep.domain> for all the servers, e.g. <http://glorep.unipg.it>

A user login form with a light green background. It has the title 'User login' at the top. Below the title are two input fields: 'Username \*' and 'Password \*'. Below the password field is a link that says 'Request new password'. At the bottom of the form is a 'Log in' button.

## GLOREP login

To access to GLOREP you must be an authenticated user in at least one GLOREP server.

Type your credentials, **Username** and **Password**, in the **User login** form.



The diagram illustrates the GLOREP login process. On the left, the 'User login' form is shown with empty input fields for 'Username' and 'Password'. A blue arrow points to the right, where the same form is shown with 'Antonio Laganà' entered in the 'Username' field and a masked password in the 'Password' field. Both forms include a 'Request new password' link and a 'Log in' button.

Then just click **Log in** button.

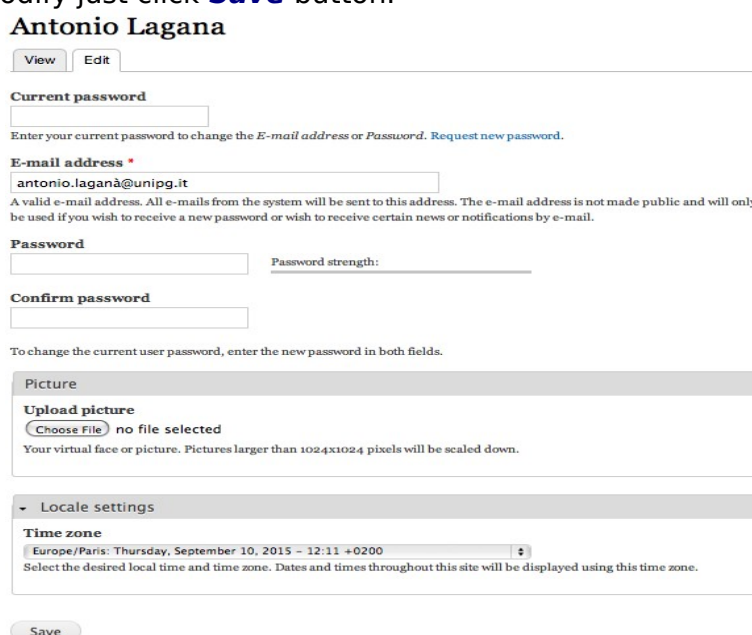
Please make sure your account is active in the GLOREP site.

## Account Editing and Logout

Once you are authenticated you can edit your account by clicking on **My account** link, or you can exit by clicking on **Log out** link.



Here you can modify your password, your email or upload a profile picture. To confirm any modify just click **Save** button.



The screenshot shows the 'My account' page for Antonio Laganà. The page has a 'View' and 'Edit' button. The 'Current password' field is empty. Below it, a note says 'Enter your current password to change the E-mail address or Password. Request new password.' The 'E-mail address' field contains 'antonio.laganà@unipg.it' and has a note: 'A valid e-mail address. All e-mails from the system will be sent to this address. The e-mail address is not made public and will only be used if you wish to receive a new password or wish to receive certain news or notifications by e-mail.' The 'Password' field is empty, with a 'Password strength' indicator. The 'Confirm password' field is also empty. A note says 'To change the current user password, enter the new password in both fields.' The 'Picture' section has an 'Upload picture' button and a 'Choose File' button, with the text 'no file selected' and a note: 'Your virtual face or picture. Pictures larger than 1024x1024 pixels will be scaled down.' The 'Locale settings' section shows the 'Time zone' set to 'Europe/Paris: Thursday, September 10, 2015 - 12:11 +0200' and a note: 'Select the desired local time and time zone. Dates and times throughout this site will be displayed using this time zone.' A 'Save' button is at the bottom.

## Add Content: Create Linkable Object

Authenticated Users can add a Linkable Object content type.

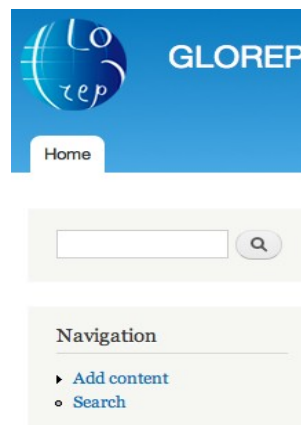
To do this just click **Add Content** link on the **Navigation** panel on the left side of the pages. This will open the **Create Linkable Object** page.

Here you have to fill out the form. The red marked fields (\*) are mandatory, the others are optional.

The offered fields follow the IEEE LOM (Learning Object Metadata) standard. In the creation phase you can choose to add a lot of information to your Linkable Object.

In the **Create Linkable Object** page, both fields, **Title** and **Description**, are to fill, even if only Title is mandatory. In the description you have to explain what the Linkable Object talk about. Please use some hot keywords in the description so the automatic **Taxonomy Assistant** will be more efficient.

As soon as you **click out of the Description** form the **Taxonomy Assistant** hints you the best category for your Linkable Object and it adds a list of tags you should use both to better describe the Linkable Object and to allow more accurate search of it.



## Create Linkable Object

**Title \***

Photocatalytic water oxidation at soft interfaces

**Description**

Article about photocatalytic water oxidation

**Chemistry & allied sciences**

--none--

**Mathematics**

--none--

Refresh Hint

*This is the list of categories that are compatible with the text and their value inherence (Hin value) and relevance (max for single term% | total %):*

*(Remember that **you haven't yet selected a category** from the vocabularies)*

Category	Keywords	Hin Value	Max Relevance	Total Relevance
541.39 - Chemical reactions	'oxidation'	100	16.7%	33.3%
547.2 - Organic Chemical Reactions	'oxidation'	66.7	16.7%	33.3%
546.2 - Hydrogen and its Compounds	'water'	66.7	16.7%	33.3%
541.34 - Solutions Chemistry	'water'	50	16.7%	33.3%

The Taxonomy Assistant hints you the max relevance category for your Linkable Object based on the title and the description you have entered before.

You just have to find the advised category in the list of category of **Chemistry & Allied sciences** or **Mathematics**.

Currently the application supports the cataloguing of LO in the fields both of mathematics and chemistry. Categories are built out from the Dewey Decimal Classification (DDC) schema for the following reasons: DDC is an updated international standard, DDC is a multi-discipline classification that covers all the relevant fields, DDC allows associating a describing label to the subject numeric code; DDC can define classes and subclasses on different specialization levels.

The structure for chemical subjects is shown below in figure.

```
540 - Chemistry & allied sciences
--541 - Physical Chemistry
--541.2 - Theoretical Chemistry
--541.3 - Miscellaneous Topics in Physical Chemistry
---541.33 - Surface Chemistry
---541.34 - Solutions Chemistry
---541.35 - Photochemistry
---541.36 - Thermochemistry & Thermodynamics
---541.37 - Electro Chemistry & Magneto Chemistry
---541.38 - Radio Chemistry (Nuclear Chemistry)
---541.39 - Chemical reactions
--541.7 - Optical Activity
-542 - Techniques, Procedures, Apparatus, Equipment & Materials
--542.1 - Laboratories
--542.2 - Containers and Accessory Equipment
--542.3 - Testing and Measuring
--542.4 - Heating and Distilling
--542.6 - Filtering and Dialysis
--542.7 - Gas Production, Processing, Measuring
--542.8 - Auxilliary Techniques and Procedures, Electrical and Electronic Equipment
---542.84 - Electrical Equipment
---542.85 - Chemistry Data Processing
-543 - Analytical chemistry
--543.1 - General Topics in Analytical Chemistry
--543.2 - Classical Methods
--543.4 - Electro Chemical Analysis
--543.5 - Optical Spectroscopy (Spectrum Analysis)
--543.6 - Non-Optical Spectroscopy
--543.8 - Chromatography
-546 - Inorganic Chemistry
--546.2 - Hydrogen and its Compounds
--546.3 - Metals, Metallic Compounds, Alloys
--546.4 - Group 3
--546.5 - Groups 4, 5, 6, 7
--546.6 - Groups 8, 9, 10, 11, 12, 13, 14
--546.7 - Groups 15, 16, 17, 18
--546.8 - Periodic Law and Periodic Table
-547 - Organic Chemistry
--547.1 - Physical And Theoretical Chemistry
--547.2 - Organic Chemical Reactions
--547.4 - Aliphatic Compounds
--547.5 - Cyclic Compounds
--547.6 - Aromatic Compounds
--547.7 - Macro-Molecules and Related Compounds
--547.8 - Other Organic Substances
```

At your click in the chosen category (e.g. [541.39 - Chemical reactions](#)), the

following list of synonyms will appear automatically.

#### Chemistry & allied sciences

541.39 - Chemical reactions

#### Mathematics

--none--

#### Synonyms for 541.39 - Chemical reactions:

'heterogeneous reaction'; 'Chemical equilibriums'; 'homogeneous reaction'; 'Condensation'; 'law of mass action'; 'Le Chateliers principle'; 'Chemical reactions and synthesis'; 'Addition'; 'catalysis'; 'Chain'; 'kinetic chemistry'; 'kinetics of specific reactions'; 'irreversible reaction'; 'Hydrolysis'; 'Reaction kinetics'; 'Substitution'; 'Specific reactions'; 'reversible reactions'; 'Reduction'; 'Polymerization'; 'Oxidation';

Then, using proposed synonyms, you can refine your description and if you want push the **Refresh Hint** button to re-run the taxonomy assistant.

In the **Keywords** field you can add some words or some of the synonyms appeared before in order to make the search more accurate.

#### Keywords

Oxidation, catalysis

Please insert one or more keywords (separated by commas) that describes this Linkable Object.

In the **Author(s)** field you must (\*) add the name/s (separated by commas) of the Author/s contributing to this LO.

#### Author(s) \*

Malte Hansen, Fei Li, Licheng Sun and Burkhard König

Please insert the name(s) of the author(s) (separated by commas) contributing to this Linkable Object.

#### Linkable Object type \*

✓ Select Options  
Learning Object  
Software Attachment

The object you are creating is a Learning Object or a Software Attachment.

▶ General

The **Linkable Object type** provides the users the possibility to choose one of the two types of content you must (\*) add: Learning Object or Software Attachment. A Software Attachment is a software that will be necessary by some Learning Objects (for reading or playing the content) and a Learning Object could be all the other types of files like slides, books, experiments and so on (in our example Linkable Object type is Learning Object).

Now some extra information can be added to your Linkable Object. The kind of information you can add is IEEE LOM compatible.

If filled properly, all of this information will be visible in your Linkable Object.

This extra information are all optional except the **Copyright and other restrictions** in the **Right** form.



## - General

### Coverage

Please select the time, culture, geography or region to which this linkable object applies.

### Structure

Atomic

Please select the structure of this linkable object.

### Aggregation

Lesson

Please select the aggregation level of this linkable object.

## - Lifecycle

### Status

Final

Please select the completion status or condition of this linkable object.

## - Technical

### Installation Remarks

Please describe how to install this linkable object.

### - Requirements

#### Type

Operating System

Please select the type of technology required to use this linkable object.

#### Name

Select options

Please select the name of the technology required to use this linkable object.

#### Minimum Version

Please select the minimum version of the technology required to use this linkable object.

#### Maximum Version

Please select the maximum version of the technology required to use this linkable object.

### Other Platform Requirements

Please insert more information about other software and hardware requirements.

### Duration

Format example: 01h30m or 45m00s; Please insert the duration time of this linkable object (useful if the linkable object contain files like movies, sounds or animations).

▼ Educational

**Interactivity Type**  

Please select the predominant mode of learning supported by this linkable object.

**Learning Resource Type**  

Please specify the kind of linkable object.

**Interactivity Level**  

Please specify the degree of interactivity characterizing this linkable object.

**Semantic Density**  

Please specify the degree of conciseness of this linkable object.

**Intended End User Role**  

Please specify the principal users for which this linkable object is designed.

**Context**  

Please specify the principal environment within which the learning and the use of this linkable object is intended to take place.

**Typical Age Range**  

Please specify the age of typical intended user.

**Difficulty**  

Please specify how hard is to work with or through this linkable object.

**Typical Learning Time**  

Format example: 01h30m or 45m00s; Please specify approximative time it takes to work with or through this linkable object.

**Description**  

Please specify comments on how this linkable object is to be used.

The only required field is **Copyright and Other Restrictions**. Here you can choose if the file you will upload is protected and in the **Description** field you can specify the conditions of use of the Linkable Object.

**Rights**

**Cost**  

Please specify if this linkable object requires payment.

**Copyright and Other Restrictions \***  

Please specify if there are copyright or other restrictions applies to the use of this linkable object.

**Description**  

Please specify comments on the conditions of use of this linkable object.

Finally you can add files to your Linkable Object in the **Attach new File** form. Click on the **Choose File** button, choose the file from the PC filesystem,


**Select the dependencies for this file**

Select the software attachment(s) that this object needs, they will be automatically downloaded along with this object.

**Attach new File**

*If your file is more than 90Mb please insert a download link in a pdf file and upload it.*

**Add a new file \***

 Photocatalyti...nterfaces.pdf


Files must be less than **90 MB**.  
Allowed file types: **jpg jpeg png gif txt doc xls pdf ppt pps odt ods odp zip avi mov mpeg mpg mp4 mp3**.

then click on the **Upload** button to transfer the file in a temporary server storage.

**Attach new File**

*If your file is more than 90Mb please insert a download link in a pdf file and upload it.*

[Show row weights](#)

File Information	Operations
<div style="display: flex; align-items: center;"> <span style="font-size: 1.2em; margin-right: 5px;">+</span>  Photocatalytic water oxidation at soft interfaces.pdf (3.44 MB)         </div> <p><b>Description</b></p> <div style="border: 1px solid #ccc; padding: 2px; width: 100%;">Lesson</div> <p style="font-size: 0.8em; margin-top: 5px;">The description may be used as the label of the link to the file.</p>	<input type="button" value="Remove"/>

**Add a new file**

no file selected

Files must be less than **90 MB**.  
Allowed file types: **jpg jpeg png gif txt doc xls pdf ppt pps odt ods odp zip avi mov mpeg mpg mp4 mp3**.

The allowed file **max size** is **90Mb**. The extensions can be modified by the Administrator, so if you need a particular extension please contact the Administrator (remember: you can compress your file in a zip file).

All the files you want to upload are scanned by an internal Antivirus that grant the goodness of your file. If there is a virus the file can't be uploaded.

If your Linkable Object needs two files, you can choose the first and push **Upload** button,


**Select the dependencies for this file**

Select the software attachment(s) that this object needs, they will be automatically downloaded along with this object.


**Attach new File**

*If your file is more than 90Mb please insert a download link in a pdf file and upload it.*

[Show row weights](#)

File Information	Operations
<div style="display: flex; align-items: center;"> <span style="font-size: 1.2em; margin-right: 5px;">+</span>  Photocatalytic water oxidation at soft interfaces.pdf (3.44 MB)         </div> <p><b>Description</b></p> <div style="border: 1px solid #ccc; padding: 2px; width: 100%;">Lesson</div> <p style="font-size: 0.8em; margin-top: 5px;">The description may be used as the label of the link to the file.</p>	<input type="button" value="Remove"/>

**Add a new file**

 ChemComm.pdf

Files must be less than **90 MB**.  
Allowed file types: **jpg jpeg png gif txt doc xls pdf ppt pps odt ods odp zip avi mov mpeg mpg mp4 mp3**.

then the second one and re-push **Upload** button.



**Select the dependencies for this file**

Select the software attachment(s) that this object needs, they will be automatically downloaded along with this object.

Attach new File

*If your file is more than 90Mb please insert a download link in a pdf file and upload it.*

[Show row weights](#)

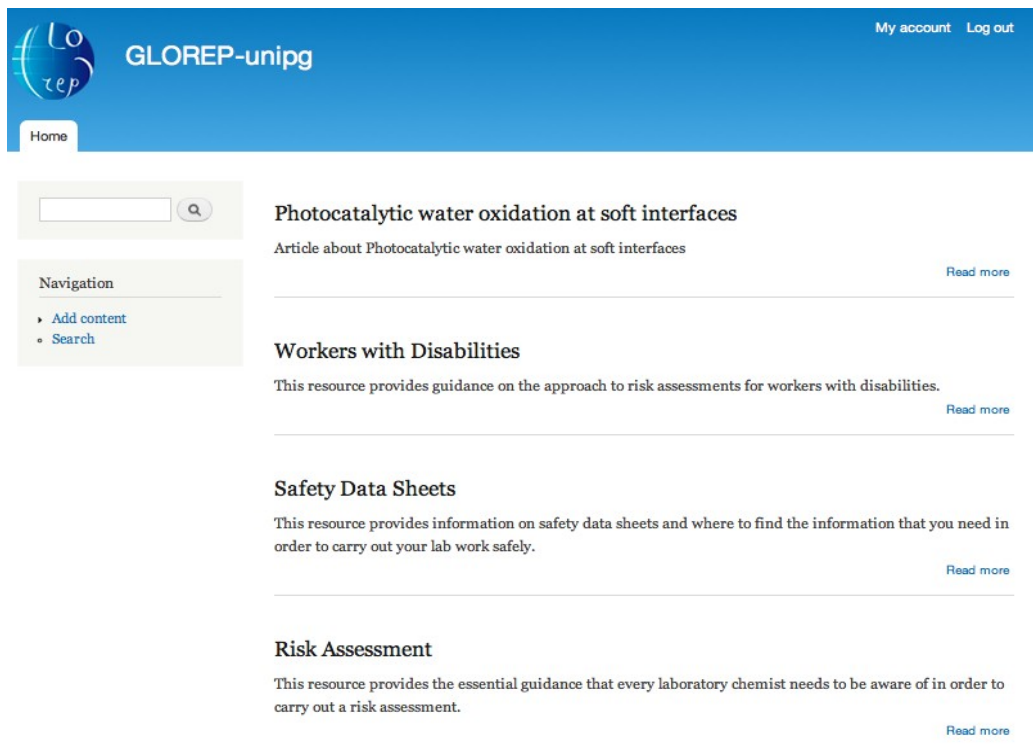
File Information	Operations
<p>+  Photocatalytic water oxidation at soft interfaces.pdf (3.44 MB)</p> <p>Description</p> <input type="text" value="Lesson"/> <p>The description may be used as the label of the link to the file.</p>	<p>Remove</p>
<p>+  ChemComm.pdf (147.7 KB)</p> <p>Description</p> <input type="text" value="Read me"/> <p>The description may be used as the label of the link to the file.</p>	<p>Remove</p>

**Add a new file**

no file selected

Files must be less than **90 MB**.  
Allowed file types: **jpg jpeg png gif txt doc xls pdf ppt pps odt ods odp zip avi mov mpeg mpg mp4 mp3**.

Once you have filled the required field(s) you can click **Save** button to save your Linkable Object (it will be possible to modify it later).  
You have successfully added a content in Glorep!



The screenshot shows the GLOREP-unipg website interface. At the top, there is a blue header with the GLOREP logo and navigation links for 'My account' and 'Log out'. Below the header is a search bar and a navigation menu with options for 'Add content' and 'Search'. The main content area displays search results for 'Photocatalytic water oxidation at soft interfaces', including a brief description and a 'Read more' link. Other search results include 'Workers with Disabilities', 'Safety Data Sheets', and 'Risk Assessment', each with a brief description and a 'Read more' link.

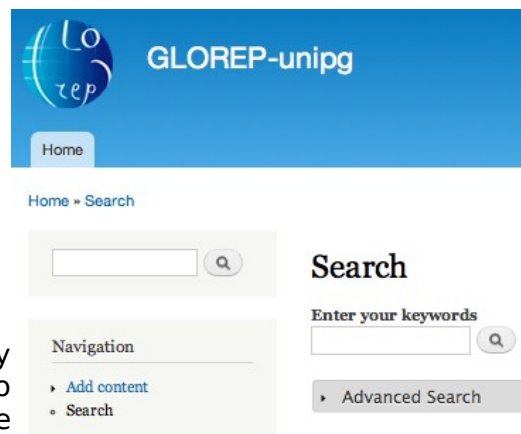
## Search LO

All authenticated users can search a Linkable Object in the repository.

To do this just click **Search** on the **Navigation** panel on the left side of the page.

This will open the **Search** page where you can do a classical full text search.

If you want to do an advanced search by filtering with some LO metadata, you have to click on **Advanced Search** to enter in the **Advanced Search form**.



## Search

Enter your keywords

Advanced Search

Enter words to search only in description field

Authors   
Enter the author(s) of the element

Only in the category

Chemistry & allied sciences  
540 - Chemistry & allied sciences  
--541 - Physical Chemistry  
---541.2 - Theoretical Chemistry  
---541.3 - Miscellaneous Topics in Physical Chemistry  
---541.33 - Surface Chemistry  
---541.34 - Solutions Chemistry  
---541.35 - Photochemistry  
---541.36 - Thermochemistry & Thermodynamics  
---541.37 - Electro Chemistry & Magneto Chemistry

Only of the type(s)

Learning Object  
 Software attachment

Other

General

Aggregation  
Select options   
Please select the aggregation level of the linkable object.

Rights

Copyright and Other Restrictions  
Select options   
Please specify if there are copyright or other restrictions applies to the use of the linkable object.

Educational

Learning Resource Type  
Select options   
Please specify the kind of linkable object.

Intended End User Role  
Select options   
Please specify the principal users for which this linkable object is designed.

Context  
Select options   
Please specify the principal environment within which the learning and the use of the linkable object is intended to take place.

Difficulty  
Select options   
Please specify how hard is to work with or through this linkable object.

Here you can search by:

- **words** inserted in **Title** and **Description** fields,
- **authors**,
- a selected **category** of the taxonomy,
- linkable object **type**.

Clicking in **Other** you can add other filters in your search

All of these filters are optional.

Once you have filled the form with the information you want to search just click on the **lens button** at the end of the form.

This is an example of a simple advanced search.



## Search

Enter your keywords

Advanced Search

Enter words to search only in description field

Authors

Enter the author(s) of the element

Only in the category

Chemistry & allied sciences

- 540 - Chemistry & allied sciences
- 541 - Physical Chemistry
- 541.2 - Theoretical Chemistry
- 541.3 - Miscellaneous Topics in Physical Chemistry
- 541.33 - Surface Chemistry
- 541.34 - Solutions Chemistry
- 541.35 - Photochemistry
- 541.36 - Thermochemistry & Thermodynamics
- 541.37 - Electro Chemistry & Magneto Chemistry

Only of the type(s)

Learning Object

Software attachment

Other

Q

First type the **words** to search in description fields, like *two body*.

Then type the **Author**, in this case *Laganà*.

And select *Learning Object* as **type** of search result.

Finally click on the *lens* button.



✓ "two body" author:Laganà type:lo

Home • Search • searchLO

Navigation

- Add content
- Search

## Search

Enter your keywords

Advanced Search

### Search results

[The quantum description of the two body problem: time dependent and time independent formalisms for some model interactions](#)

The slides describe how the two **body** problem can be treated quantum mechanically in both time dependent and ... Learning Object: 8-THE QUANTUM DESCRIPTION OF THE TWO **BODY** PROBLEM\_o.ppt Authors : Laganà Last modify on: 2014-28-08 ...

Antonio Laganà - 08/28/2014 - 16:59 - 0 comments

[The numerical solution of the quantum description of the two body problem](#)

The slides describe how the two **body** problem can be solved numerically for the generic potential and its ...

Antonio Laganà - 08/28/2014 - 17:07 - 0 comments

This is the results of your search.

Just *click* on one of the Linkable Object titles to open it.

Let's try with the first.

**GLOREP-unipg** My account Log out

Home

Home

Navigation

- Add content
- Search

**The quantum description of the two body problem: time dependent and time independent formalisms for some model interactions**

The slides describe how the two body problem can be treated quantum mechanically in both time dependent and time independent methods and which are the solutions for some popular model potentials

[Download!](#)

Files included in this Learning Object:

- 8-THE QUANTUM DESCRIPTION OF THE TWO BODY PROBLEM\_o.ppt

Authors : Lagana  
Last modify on: 2014-28-08 16:59:25

Rights  
Copyright and Other Restrictions : no

Add new comment

Your name sergio  
Subject  
Comment \*

Text format Filtered HTML More information about text formats

- Web page addresses and e-mail addresses turn into links automatically.
- Allowed HTML tags: <a> <em> <strong> <cite> <blockquote> <code> <ul> <ol> <li> <dl> <dt> <dd>
- Lines and paragraphs break automatically.

[Save](#) [Preview](#)

It will open the Linkable Object page, in which we can read the entire description and other information.

In the page bottom the searching user can **Save** any comment about the Learning Object and its usage (suggestions, errors, different versions, etc.)

By clicking **Download** button it will start the download of the package containing in this case the ppt file.

**GLOREP-unipg** My account Log out

Home

Home

Navigation

- Add content
- Search

Downloads

8-THE QUANTUM DESCRIPTION OF THE TWO BODY PROBLEM\_0.ppt  
96.9 KB

Clear 1 Download

[Download!](#)

Now you have successfully downloaded the Learning Object in your PC.





# The EOL System



<http://echemtest.eol.unipg.it>

# The EchemTest+ based on the EOL e-Assessment platform

The EchemTest assessment system is following a very important restructuring process, migrating from the proprietary QuestionMark Perception suite to the Open Source platform EOL, developed by Perugia University, Italy, in collaboration with Tesseloniki University, Greece. We are presenting the new system based on the Exams On Line (EOL) system, focusing the attention in the aspects and issues in which the two versions differ.

## Introduction

We are presenting a software platform named *Exams On Line* (EOL) aimed at providing to the teachers and to evaluators a powerful tool for assessing the competencies and skills acquired by students during e-learning and/or blended learning courses and conventional classes.

The software originated at the end of the 90's from a Leonardo 2 project devoted to promoting the Lifelong Learning, named *DASP - Distance Assessment System for accreditation of competences and skills acquired trough in company Placements* (1997-2000).

The software has been then further developed in order to fulfil the needs of the academic environment and to enable the teacher to carry out the exams related to a university course. Further extension have been carried out to adapt the system also to commercial environments. The project has been released under the GNU GPL license and is based entirely on Open Source components.

EOL is a web application that represents a complete environment for performing the e-assessment of an high number of students who access the system from computer labs, under the control and the supervision of the teacher.

Each student is assigned an individual test. The questions of the test are fished up from a set of questions the teacher defined for the named subject, classifying each question according to 3 levels of difficulty (low, medium, high). If needed, the teacher may force some question to be fished up in each test. The sequence of answers associated to each question are presented to the student in a random sequence, to reduce the possibility of frauds.

The student, once registered to EOL web site, may enroll in the named exam and, once provided the password associated to the exam and notified by the teacher during the exam session, she/he can perform the assessment test. All questions are shown as a list; the student may respond to a given question, update a question, until the student considers the test completed and she/he send the responses to EOL server.

When all students completed their tests, the teacher may review and publish the results. The exam session may be then archived for future reference and for collecting the statistical information about the subject.

A series of report may be produced, that facilitate the extraction of some useful information about the students and the exams of the named subject.

The EOL system is a web application and as such is portable; however since it uses extensively **Ajax** calls, the web browser has to fully support Ajax. Furthermore the web browser has to support **HTML5** and **Javascript**.

## EOL features

EOL enable administrators, teachers and students to carry out the operations described below.

As per the Administrator:

1. Manage the information related to the web site (name, context, layout, etc)
2. Create accounts for teachers, examiners and students

3. Assign the Administrator privilege to teachers, if necessary
4. Define the classrooms suitable for carrying out texts

As per the Teacher:

1. Create subjects subdivided in topics and manage only those under its jurisdiction
2. Create questions of different types (Multiple Response, Multiple Choice, Yes/No, True/False, Text Match, Hot Spot, Numeric, Open Response) and difficulty (low, medium, high) managing also the responses.

As per the Examiner:

1. Set exams with variable settings (number of questions, difficulty, etc)
2. Manage exams in authorized classrooms, using subscription lists public or private.
3. Produce the report of each exam and other types of report related to the statistical information about exams and students

As per the Student:

1. Register to the system with unique credentials
2. Enroll in a exam
3. Execute the test from one of the authorized computer rooms

The EOL system is multilingual. The number of local languages is determined dynamically at runtime. There are two separate aspects we have to take into account: the language of the User Interface and of the web pages and the language in which are expressed questions and responses. The first one is under control of the System Administrators, who have to add the language localization adding a subdirectory in the source files (under langs directory) and adding two classes, one for the PHP related strings of text, the other for the Javascript ones. Each detected language is identified by the corresponding flag shown in the web pages, so that the student can change the most appropriate language dynamically.

The localization of the questions and responses is instead under the Teacher control, who is responsible of adding the corresponding text in the considered local language for both text and responses.

## Data management

EOL has been designed according to the current best practices: firstly has been carried out the collection and analysis of both the functional and end-users requirements. Then, a conceptual scheme has been defined using an high level data model. The scheme describes in a concise way the requirements, including a detailed list of entities, relations and constraints. In figure 1 is shown the *Entity-Relation Model* for EOL System. The subsequent phase is represented by the translation from the high level data model to the selected Data Base Management System (DBMS) model. Finally the internal data structures, the data access rules and the file organization are defined.

We decided to maintain a separated database abstraction layer, via the *sqlDB* method, so that most of the source code of EOL is independent from the type of DBMS selected. In particular, the abstraction layer is composed by a set of *public methods* to carry out specific operations (i.e.: *qSubjects*, *qQuestionDetails*, *qStartExam*, etc) and a set of *private methods* to communicate with the DBMS (i.e.: *connect*, *execTransaction*, *getError*, etc). The present implementation of the DBMS is based on the popular open source DBMS MySQL.

To facilitate the future developments of the EOL program, a specific framework has been created, based on the Controller/Action/View paradigm: the *Controller* verifies the existence of the required operations and execute them after having controlled the access permissions; the *Action* is a single operation required by the user and executed by the Controller; the *View* is represented by the PHP code able to represent the portion of the web page.

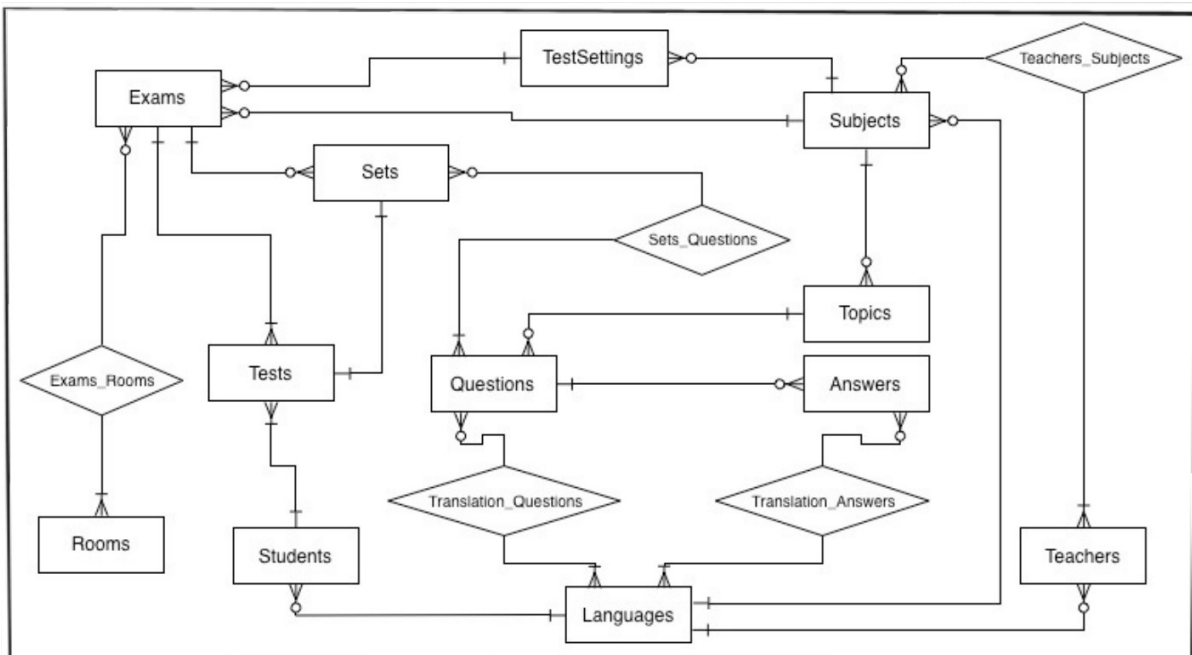


Figure 1 - The EOL's final Entity Relation Model

Most of the actions are required through Ajax calls, that make it possible to have a responsive and easy to use web site.

Figure 2 shows the login panel of EOL system.

The login field for all types of users is defined with the email address specified during the registration. This mechanism differs from the previous system, where the license fee were evaluated on the basis of the number of users. In the present case each user retains its identity over time.

**The algorithm for fishing up the questions**

Once defined the pool of questions for a given subject, distributed among the various topics and the associated level of difficulty, the teacher can define an exam that may be composed by all topics or by some of them (i.e.: for mid-term evaluations).

The algorithm adopted for the efficient fish-up of the questions for each test is articulated in various steps, described in the text below described.

The first step consists in the retrieval of the text settings, in order to define the total number of questions, the distribution of the questions among topics, the mean difficulty of the text.

In the next step it is computed the number of questions per topic, according to the type of distribution received in the previous step.

Then, for each topic, the total number of active questions are extracted, sorted in ascending order by the identifier *askedUtil* (number of times the question has been extracted). The first question (the one has been extracted fewer times) is the first question fished up. The subsequent question is selected in the pool of question in order to reach the desired mean difficulty of the test and preferring the questions with a lower *askedUtil*, until all question for a given topic have been fished up.

The same procedure is repeated for all Topics until the total number of question to be fished up is reached.

## Migration of the EchemTest® questions to EchemTest\*

The migration of the EchemTest database on the QuestionMark environment was straightforward, thanks to the work made by Emanuele Gragnoli and Elia Catana. The exporting of the Echemtest database produced **836** XML files, containing **12882** questions.

Type of question	# of questions	# of imported questions in EOL
Multiple choice	7915	<b>7915</b>
Multiple Response	1836	<b>1836</b>
Pull-down list	1146	
Hot Spot	874	
Numeric	684	<b>663*</b>
Text Match	241	<b>230‡</b>
Fill in blanks	108	
True/False	36	<b>36</b>
Matching	28	
Ranking	13	
Matrix	1	
Total	12882	<b>10680</b>

\*: in 21 questions the **XML tag** related to the **response** were empty

‡: in the case of 11 questions, the XML parser produced an error parsing the tags and returned an empty string. Such questions are related to the Greek language.

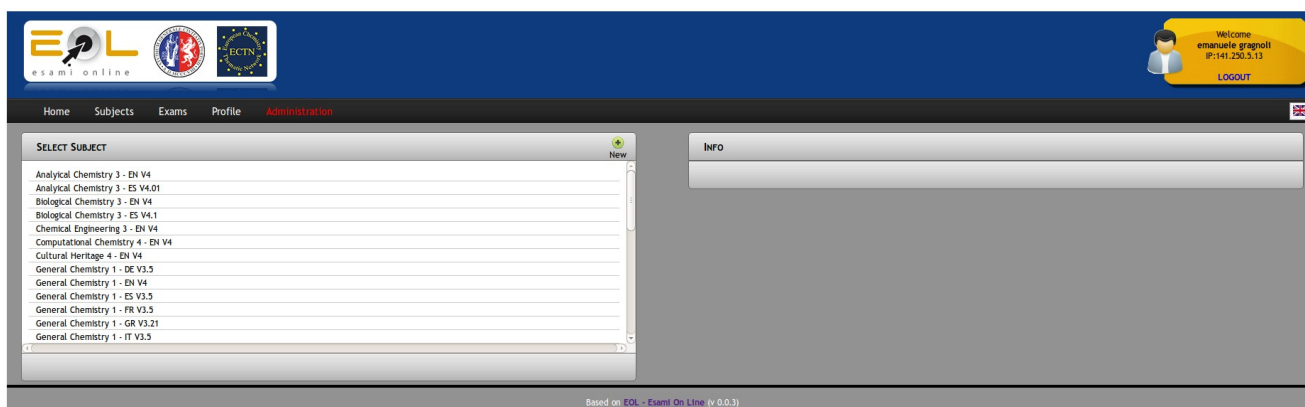
In some questions containing images, the path of the figure was wrong. Those questions have been ignored.

We are still working implementing the “Pull-down list”, the “Hot Spot”, the “Fill in blanks”, the “Matching” and the “Ranking” question types. We decided not to implement the Matrix question type.

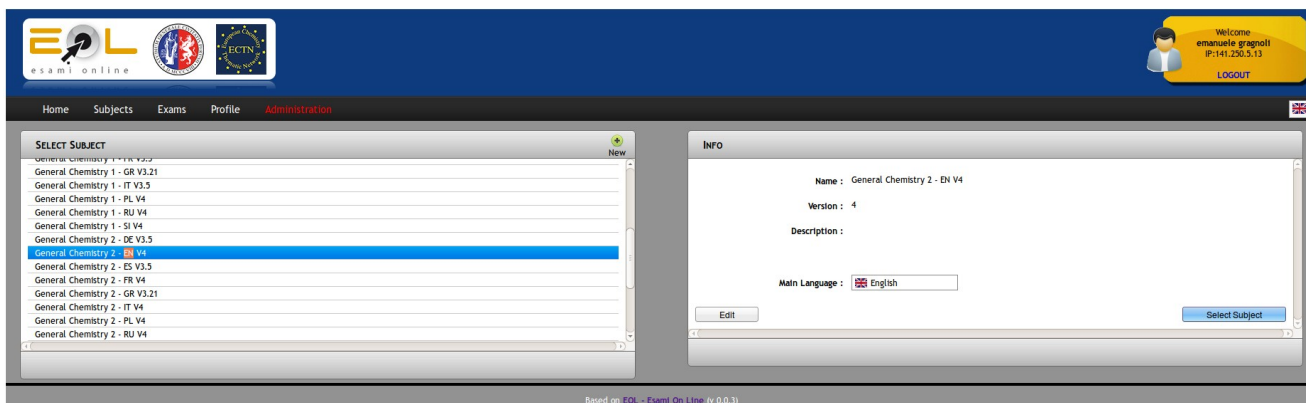
# Hands on sessions

## Defining an exam

Once specified the credentials, the user enters the system and the following web page appears. The login used in this example has been authorized for all roles: Administrator, Teacher, Examiner and Student.




Once entered into the system the user has to select the subject, among the list of the available ones, clicking on the **Subject** tab. The following figure shows the web page that will appear.

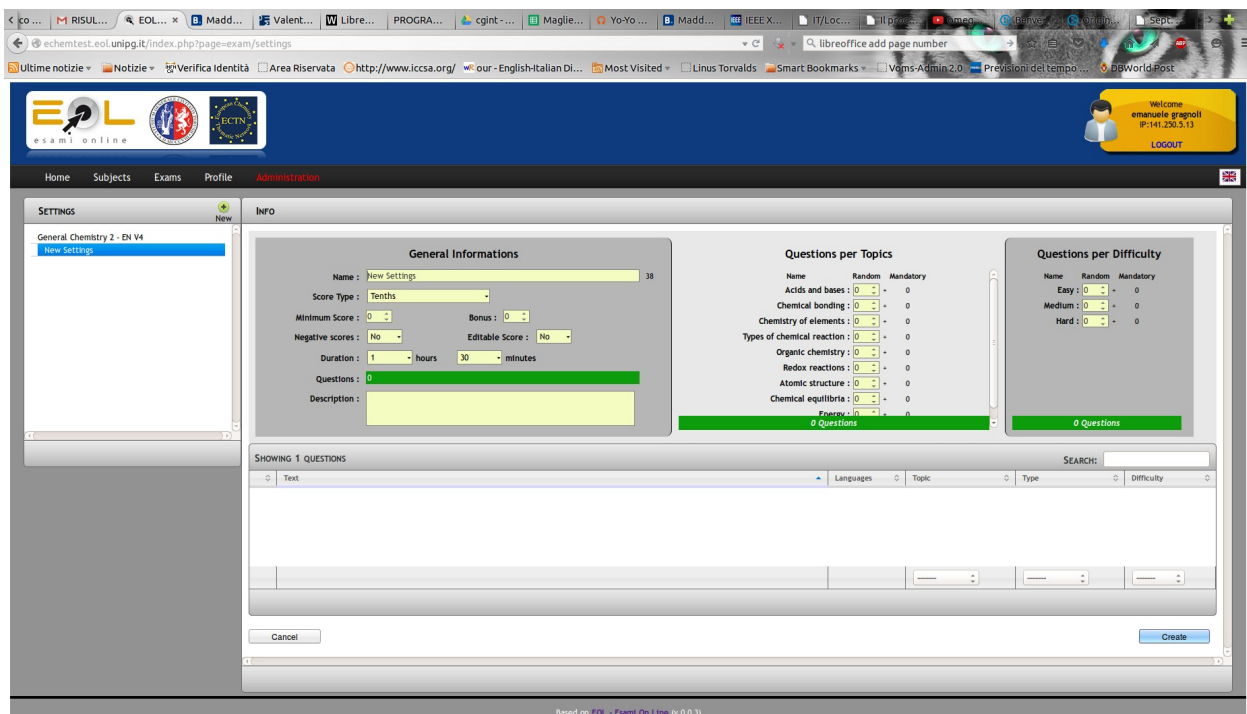


Clicking on **Select Subject** will perform the task. The following figure shows the web page that appears after such operation.

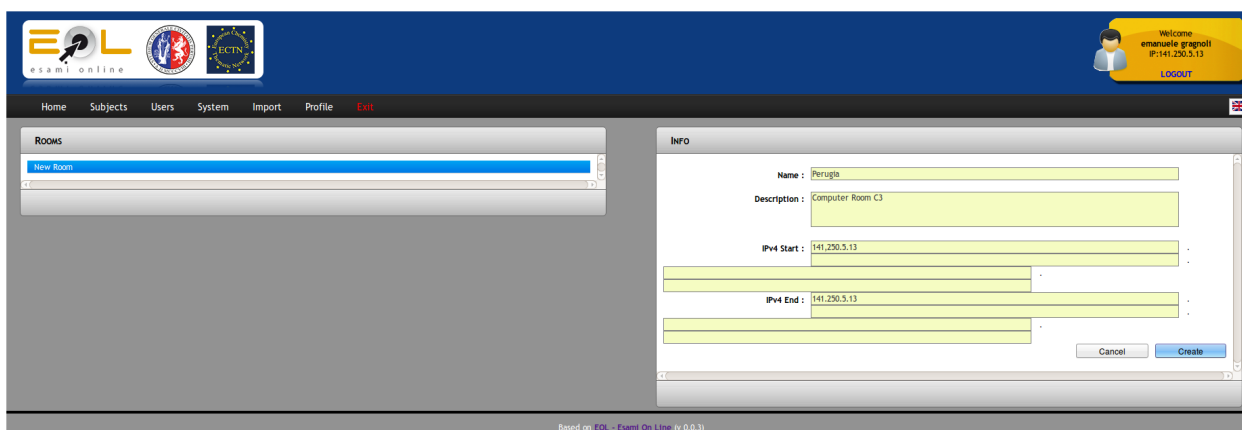
The main activity of the Testing Centers is related to the management of the exams. The first activity, to be carried out the first time the Testing Center enter the platform and then when they want to change some operational parameter, is related to the definition of a *setting*. To define a new setting, go to **Exams > Settings**. It will appear the panel shown below:

Clicking over the following button  the web page shown below will appear. This page is very important because all the main feature of the test can be established here. Furthermore, the main differences between the version based on QuestionMark and the present one are evident in this section. The user can assign a name to the setting she/he is creating. Then the user defines how the score should be represented (in tenths, thirtieths, hundreds). Then she/he has to define (if requested) the *minimum score* to pass the exam, if a *bonus* should be added to all tests. One important aspect is the so called *negative score*: if the value is *Yes*, then the wrong responses will induce a negative score in the total one; if the value is *No*, then the wrong responses count 0 in the final score. The Editable score enables the Examiner to alter the final score of the test (a sort of semantic analysis of responses is permitted). In the *Duration* field the Examiner sets the total duration of the test. The other important phases are the selection of the questions per topics and per difficulty. As per the selection per topics, the Examiner can establish how many questions have to be fished up by the system per each topic. All questions are classified considering the relative difficulty (easy, medium, hard), in the last panel the Examiner selects how many questions are extracted in each difficulty level. If there is a mismatch between the two panels (i.e.: different total number

of questions, the lower bar showing the totals appears in red (error), otherwise appears green (correct).

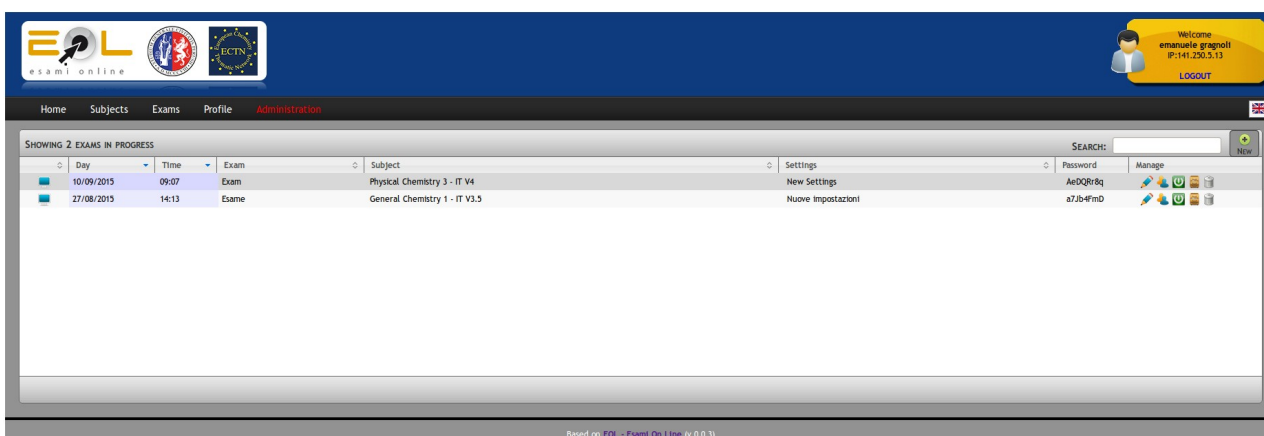


To reinforce the security of the exam sessions, the system may check the IP addresses of the clients connected during the test. The Examiner can define the IP range associated to a computer room used for the exams. In the case the computers are managed with the Network Address Translation (NAT) protocol, the range collapses in a single IP address, as shown below.



To define an exam for deploying an EchemTest assessment session, go to **Exams**. A web page summarizing the exams defined will appear, as shown in the following figure.

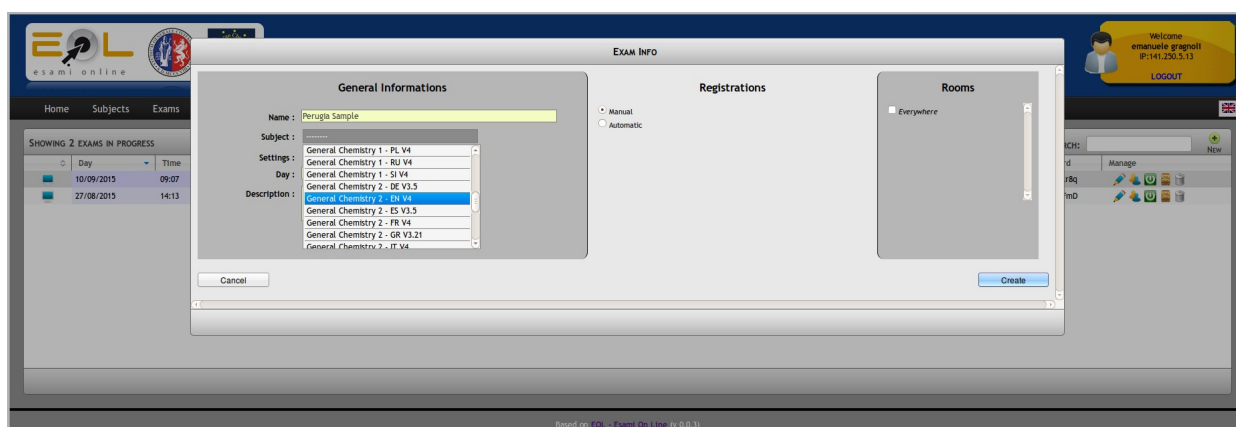




Clicking over the following button

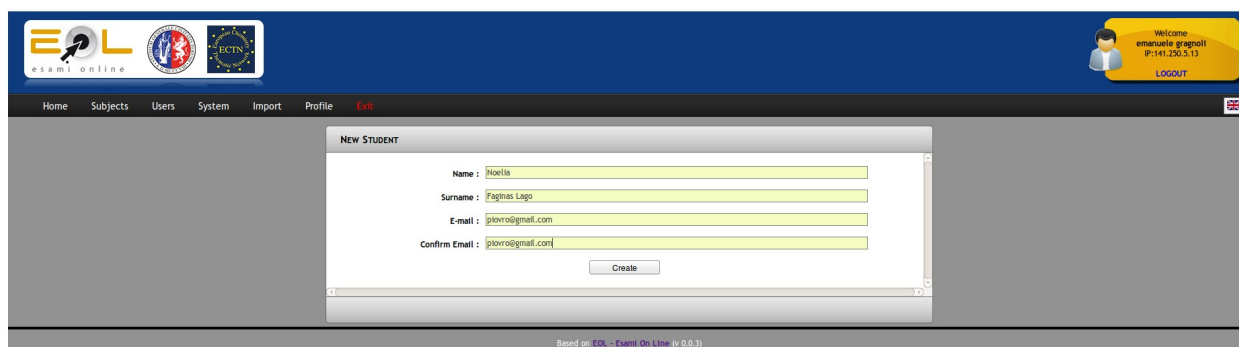


the web page shown below will appear.

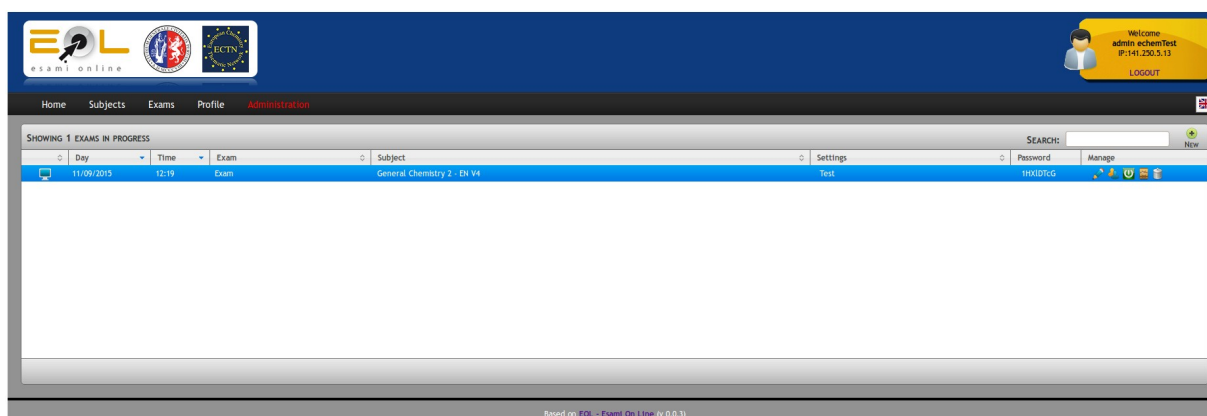


After having defined the name associated to the current exam, the Examiner selects the Subject of the exam, the type of registration of the users (Manual, Automatic) and the Room (if needed).

The *Registration* of type *Automatic* means that all connected students can select the exam from the list of the activated ones. As an alternative the Examiner can add manually the students to the exam, selecting them among the users defined into the system. If she/he prefers, she/he can define manually the users from a panel like the following:



After having defined the exam, the following web page appears:



Each exam session is represented by a row, where the relevant information are shown (in particular the password associated to the exam that each student has to enter after the login and after having selected the named exam, in order to receive the list of questions). In the row there are also some action buttons, associated to the following operations: Edit, Students, Activate/Stop, Archive and Delete. Some of them are associated to the corresponding operations like: edit, archive and delete. Students means that a new panel with the list of registered students is shown, updated with the current operations they have made. Activate/Stop allows the Examiner to activate the exam session and to stop it.

The updated versions of the present document will be available on the VIRT&L-COMM at the following URL: <http://www.hpc.unipg.it/ojs/index.php/virtlcomm>