

The experience of a plan to promote the creation of a repository of reusable digital learning objects within the UPV

Aristóteles Cañero¹, Miguel Ferrando², Jaime Busquets³ and Carlos Turro³

¹Área de Sistemas de Información y Comunicaciones, Universidad Politécnica de Valencia, Camino de Vera, 46022 Valencia, Spain - acanero@asic.upv.es - ²Vicerrectorado de Tecnologías de la Información y las Comunicaciones, Universidad Politécnica de Valencia, Camino de Vera, 46022 Valencia, Spain - ³Área de Sistemas de Información y Comunicaciones, Universidad Politécnica de Valencia, Camino de Vera, 46022 Valencia, Spain.

Keywords

Repository of reusable digital learning objects. Sakai. Dspace. Synchronized media. E-learning.

1. EXECUTIVE SUMMARY

After the experience of the first year as the largest deployment of Sakai in Europe, in the Universidad Politécnica de Valencia we have started a project to promote the creation of a repository of reusable digital learning objects based in Dspace and on the experience of our implementation of Sakai and advanced multimedia objects such as synchronized media and virtual experimentation laboratories.

This repository has been placed as a collection within the digital repository of the Library of the University, based in Dspace.

The main types of objects promoted by the plan are Polimedia (technology developed by the UPV to present streaming media synchronizing the motion image of the teacher and his voice with a computer screen) and Virtual Labs (also developed by the UPV, to allow teachers to create interactive experimental objects within the contents of the subjects).

The plan is created to train, assist and give economic incentives to teachers to promote the creation of the objects. After the first edition of the plan, more than 1,000 objects have been created, and in the second edition that has recently started, there is a estimation of 2,000 new objects to be created by 205 teachers.

2. INTRODUCTION

In September 2006 the UPV launched a large implementation of Sakai with more than 4,000 sites. The preliminary results of this experience were presented in the EUNIS 2006 and 2007 conferences. In September 2007 we started our second academic year based on Sakai and we have evaluated our experience for the first year as very positive.

In these two years, a great effort has been done by the teachers in the production of contents and resources for all of the sites.

The purpose of the project that we have started this year is to create a repository of reusable digital learning objects, based in some of the materials produced during these first years for the Sakai sites, and also with the creation of new multimedia and interactive contents.

3. OUR CONCEPTS OF DIGITAL LEARNING OBJECTS AND LEARNING MODULES

3.1. Digital Learning Objects

Our concept of a Digital Learning Object is defined as “a digital, self-contained, reusable entity with a learning aim that contains the content, the metadata and the information which helps its identification, storage, and recovery”. Learning objects can be classified in different categories.

Depending on their pedagogical content:

- Conceptual
- Procedural
- Attitudinal

Depending on the format of the objects:

- Text
- Image / sound / video / multimedia
- Interactive applications

The steps in the creation of a learning object are:

1. Determine the objectives: conceptual, procedural or attitudinal
2. Create the objects
 - Choose format (text, multimedia, interactive)
 - Create the introduction of the content
 - Create the content
3. Complete the metadata form

Category	Elements
General	Title
	Languages
	Description
	Keywords
	Authors
Learning use	Type of learning object
	Interactivity level
	Semantic density
	Receiver
	Context
	Difficulty
	Estimated time
	Description of the use
Language of the receiver	

Figure1: Example of a Metadata Form

3.2. Learning modules

Learning modules can be created combining different learning objects within a certain context.

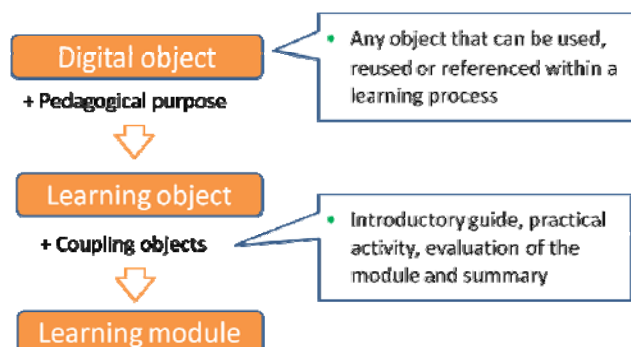


Figure 2. Creation of a learning module

A learning object can be defined as a “learning session created by the contextualization of one or several learning objects within a didactic environment with the addition of coupling objects”.

The approximate working time of the student in a learning module is one hour, including all the activities proposed in the module.

The process in the creation of a learning module is:

1. Select the competences to develop in the student
2. Select the kind of objects to work in: conceptual, procedural or attitudinal
3. Define the structure of the module
4. Search for already created learning objects which can fit in our structure
5. Create non-existing learning objects
6. Configure the module: create coupling objects
7. Test the module
8. Evaluate the module

4. TYPES OF LEARNING OBJECTS IN THE PLAN

The plan covers four types of learning objects:

4.1. Polimedia

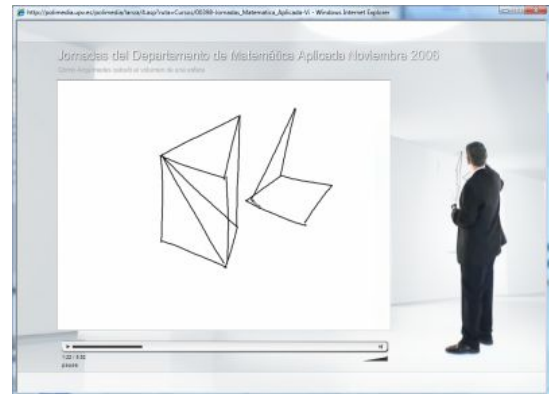
Polimedia is a streaming media technology developed by the UPV to produce learning multimedia contents, in a special way that can combine several technologies simultaneously in a web browser:

- Show computer presentations
- Use an electronic whiteboard
- Use computer applications

Video content is served by an application embedded on a web page with all multimedia material that students must receive. The application uses two streaming media channels: one for image of the teacher and another one for slides. The motion picture of the teacher channel is compressed with a MPEG4 codec giving smooth motion. On the other hand, slide channel uses a screen codec optimized for resolution. So we get both smooth video and slide quality on the receiving side.

In order to produce contents for our platform we use a small TV production set. In these studios we record two synchronized video sources, one from the teacher and another one from the slides. Those sources are combined as shown on figures 4 and 5 to be broadcasted or recorded for future use.

There are six Polimedia studios at the UPV and all the teachers can use them to record any kind of materials for their classes.



Figures 4 and 5. Two examples of Polimedia objects

4.2. Self-produced videos

Polimedia is the simplest way to create multimedia content because the teacher doesn't have to manage any camera or any other multimedia device. The multimedia operator in each studio takes care of everything.

In despite of this, sometimes the teachers need to do different kinds of materials, recording directly in a laboratory or in a particular place outside of the studios. In this case, the teachers must take care of the recording of the objects with the multimedia equipment that they have access to.

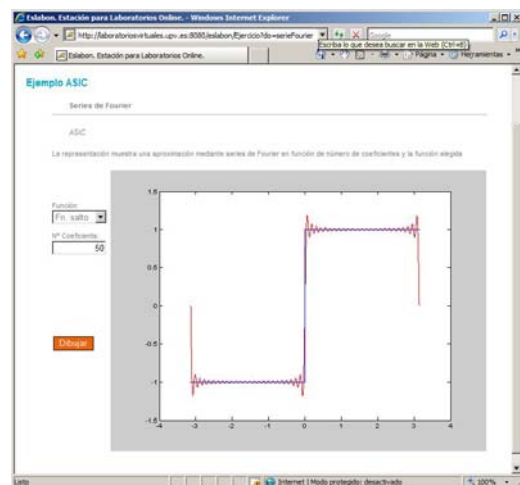
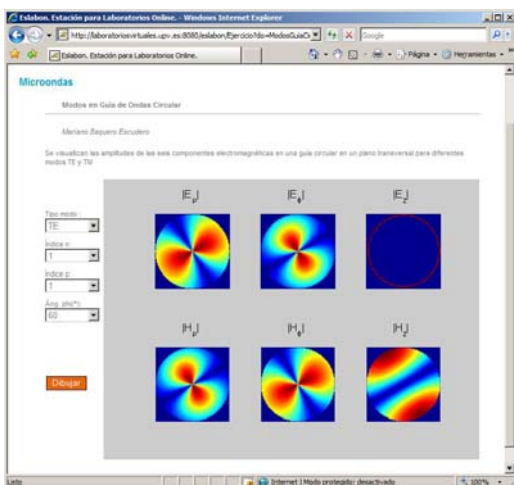
These self-produced videos can use the Politube platform, which is a self service tool to upload videos to a video streaming server in the UPV.

Only the videos uploaded in the Politube platform are considered within the Plan.

4.3. Virtual labs (Interactive numerical objects)

Virtual labs is a new set of tools that allow instructors to create learning objects for experimentation in an easy and intuitive way through the use of scientific software applications such as Matlab, Mathematica or LabView.

The teacher has to create the algorithm in these high level applications and the University provides a service to generate the objects in java and make them accessible via the Internet



Figures 6 and 7: Two examples of Virtual labs objects

4.4. Other objects

Finally there is a fourth category of objects open to the teacher's creativity in which all the teachers can propose different kind of multimedia or interactive objects, accessible via the Internet and capable of been published in a repository.

We have received many different proposals of these kinds of objects, with some of them in Flash technologies, some java applets and even some objects designed to be uploaded into cell phones.

5. REPOSITORY OF REUSABLE LEARNING OBJECTS

As we said before, the goal of the project is to build a repository of reusable learning objects within our University based in some of the materials produced during this first year for the Sakai sites, and also with the creation of new multimedia and interactive contents.

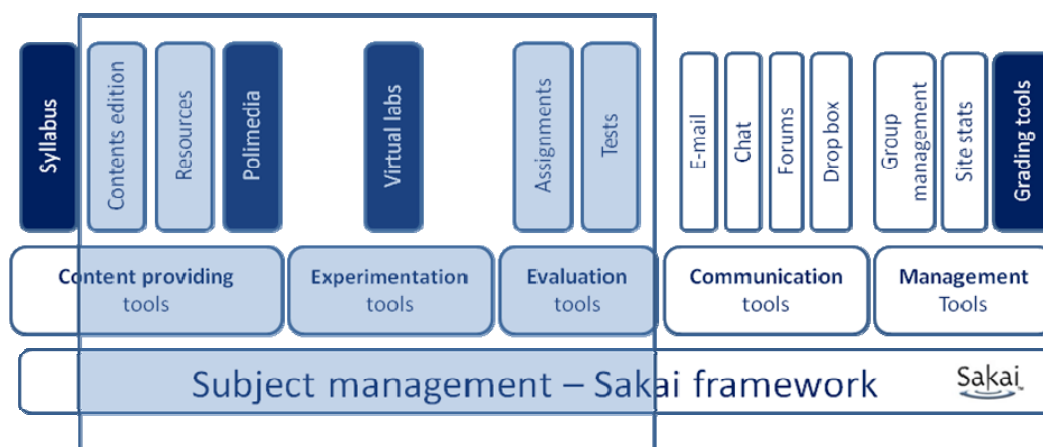


Figure 8. The Sakai framework and the kind of materials that we want to reuse in the repository

All the objects have to be stored in a common database, catalogued by the General Library and with three types of access rights:

- Any student in the same Knowledge Area (minimum requirement)
- Any student from the UPV
- Free access

The kind of license is not determined by the plan. Each teacher can decide which kind of license they intend to use.

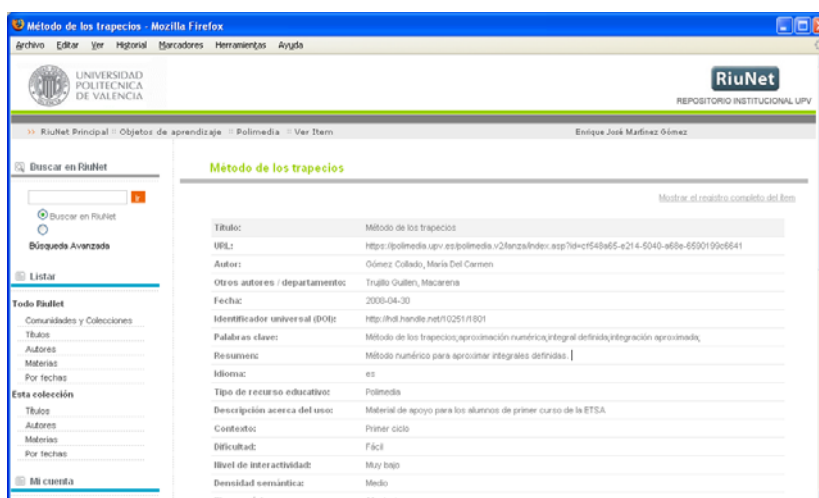


Figure 9. The Digital Repository RiuNet, based in Dspace

Dspace has been chosen as the tool to create the learning object repository. With this tool, the creators can store, classify, search and distribute all kinds of digital contents. It's a tool developed in an open source project (www.dspace.org).

The repository was presented recently, simultaneously to the completion of the first edition of the plan (May 2008).

6. DESCRIPTION OF THE PLAN

The main goal of the plan is to start the creation of the repository. The specific actions of the plan have been:

- Extensive training on learning objects theory and practice
- Economic incentive to teachers in the creation of the objects
- Assistance through the creation and evaluation of the objects after the creation

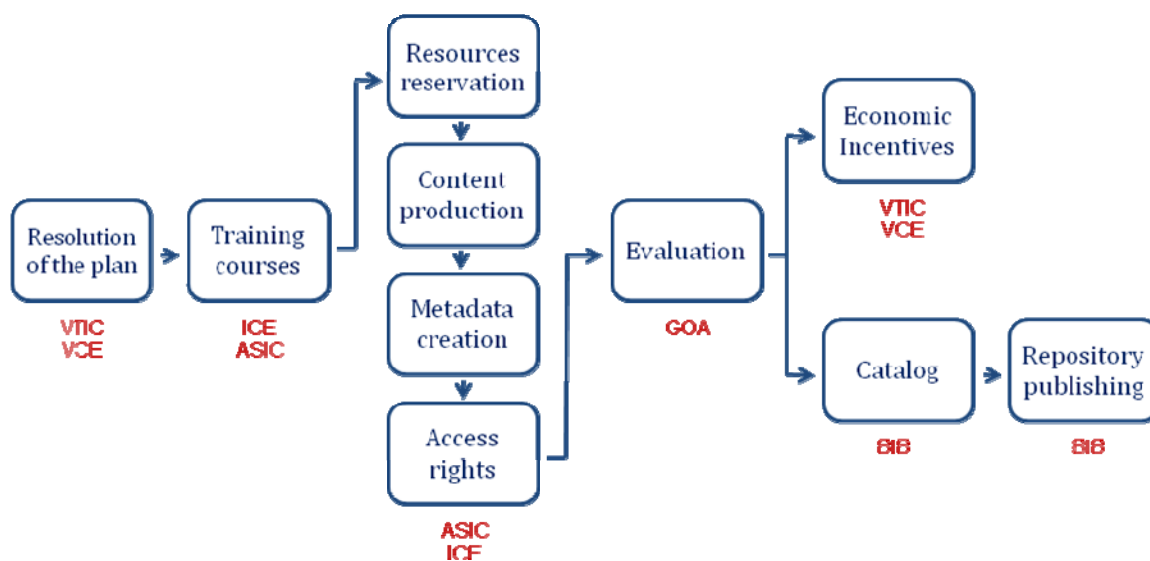


Figure 10: Process of the Plan. Steps and responsible Department at the UPV

6.1. Training

All the participants in the plan have to go through a course covering:

- Concepts of learning objects and learning modules and methodology of the creation of these kind of materials
- Types of learning objects and examples
- Pedagogical uses of learning objects
- Creation of learning objects, including the creation of a learning object within the course

This training has been offered in 12 courses of 8 hours of duration (4 hours dedicated to theory and the other 4 hours practicing the creation of different kind of objects).

6.2. Economic incentives

All the objects presented and evaluated positively have received an incentive of 50 euros per object. This is just an incentive; the property of the object is not transferred away from the teachers.

This incentive has been evaluated as very attractive for teachers. The average number of objects presented per teacher has been around 7 objects.

6.3. Assistance and evaluation

During the whole period of the plan, all the teachers have received assistance from technical staff and pedagogical guidance staff.

The responsibility of the evaluation of the objects belongs to the Learning Object Committee of each College. This Committee is created by teachers of each College. If the object is considered as “not suitable” the teacher receives an assessment and has the chance to modify the object to achieve the requirements.

7. RESULTS OF THE PLAN

7.1. First edition of the plan

The results of the first edition of the plan between October 2007 and March 2008 have been evaluated as very satisfactorily, with more than 1,000 objects created in these 6 months and 150 teachers participating in the project.

- Polimedia: 605
- Videos: 150
- Virtual labs: 250
- Others: 75

7.2. Second edition of the plan

The second edition of the plan has been recently launched with minor differences. One of the main improvements of these edition is that we also allow teachers to present and share complete learning modules. In this second edition we have suppressed the kind of objects “others” because of the difficulty of the effective sharing them through a repository.

In this second edition, 205 teachers have joined the plan for generating the objects in two production periods. These are the objects that have been proposed for each period.

1st period: May-July

- Polimedia: 485
- Videos: 270
- Virtual labs: 253
- Learning modules: 76

2nd period: September-November

- Polimedia: 652
- Videos: 369
- Virtual labs: 289
- Learning modules: 134

8. CONCLUSIONS AND LESSONS LEARNT

The main conclusions after the first edition of the plan are:

- If the University offers the right installations and resources, any kind of knowledge area can be suitable to create digital objects.
- To have a good response from the teacher's side in a process of generation of objects it is necessary that the technology simulates as much as possible the way in which the teachers usually present their classes in real life.
- In theory many learning objects can be reused, but in practice, only the objects that are produced through a standard and widespread technology in the institution are capable of being really shared and reused.
- In general, some kinds of incentives are necessary to stimulate teachers to be introduced in the use and experimentation of new learning methodologies and to convince them to share their materials. Economic incentives have been considered for the ignition of the process, but in the future, another kind of incentives (for example academic acknowledgement) will be defined.

9. REFERENCES

Turró, C.; Mengod, R.; Busquets, J.; Carratalá, I. (2006). *An Open Source Approach for E-Learning Systems Integration. The Case of Polytechnical University of Valencia*. Proceedings of the 12th International Conference of EUNIS

Cañero, A.; Turró, C.; Busquets, J.; Ferrando, M. (2007). *Experience of a Large E-Learning Platform in the Universidad Politécnica de Valencia*. Proceedings of the 13th International Conference of EUNIS