

# **“INNOVATIO EDUCATIVA TERTIO MILLENNIO”: 12 YEARS EVOLUTING FROM LEARNING TO TEACHING IN COURSES ON EDUCATIONAL INNOVATION AND COLLABORATION WITH THE UNESCO CHAIR OF MINING AND INDUSTRIAL HERITAGE**

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## **Abstract**

Twelve years ago a group of teachers began to work in educational innovation. In 2002 we received an award for educational innovation, undergoing several stages. Recently, we have decided to focus on being teachers of educational innovation. We create a web scheduled in Joomla offering various services, among which we emphasize teaching courses of educational innovation.

The “Instituto de Ciencias de la Educacion” in “Universidad Politécnica de Madrid” has recently incorporated two of these courses, which has been highly praised. These courses will be reissued in new calls, and we are going to offer them to more Universities. We are in contact with several institutions, radio programs, the UNESCO Chair of Mining and Industrial Heritage, and we are working with them in the creation of heritage courses using methods that we have developed.

Keywords: Educational innovation, applications, progress, heritage, courses.

## **1 INTRODUCTION**

The project starts in the year 2000. Even before the creation of the “Innovation Educativa Tertio Milenio”. Those who launched the idea started innovating learning by pioneering the use of email and instant messaging programs as key elements for teaching improvement. Onwards, by taking advantage of technology new possibilities unfolded for new teaching methods.

## **2 A SUCCESSFUL TRACK**

First experiences were with educational platforms such as “WebCT” (now called Blackboard). Later on, different evaluation and communication systems led us to other more effective teaching programs. At later stages, we adapted these new technologies to subjects designed for the European Higher Education Area.

In order to encourage the student and reduce absenteeism and dropouts, we did not only work in the computer field. We designed activities such as competitions and activities in which the students had to build with their own hands items related to the subject.

### **2.1 Barriers to learning Identification (years 2000-2006)**

In the year 200, some teaching problems were disclosed. A few subjects, in some Engineer Careers faced difficulties for learning. Then, three lines of action as solution search were established.

1. Lack of motivation to study the subject: a significant percentage of students showed little motivation for some subjects and focused their interest on other knowledge areas for which they had higher calling.
2. Student perception of the subject as too theoretical and with little future implementation Some subjects were considered as too theoretical and concise. On one hand they were not believed to be useful in their future, and on the other hand thought that would not be able to compete against graduates from other careers who spend more time on these subjects.

3. Good calculation skills, but deficiency to understand results: Tests with students showed that some students had enough knowledge to solve problems similar to those worked in class but were unable to conceptually understand the outcome.

## 2.2 Strategies and initial technical response (years 2000-2006)

To meet these problems, we began new initiatives to encourage student's communication with teachers using the tools they are familiar with.

1. **Using Electronic Mail as an educational tool.** Bearing in mind that in the year 2000 not all the students used e-mails or used messages on line. This was quite a novelty. Nowadays they answer and receive messages from several devices to their mobiles.
2. **First experiences with on-line teaching platforms.** Before 2002 there were already several environments and tools to support teaching. At that moment we used Web CT (now called Blackboard. We used tool such as chats and students were thrilled with this technology. Then, they used the blackboard platform, shared notes and solved questions on line. This was such a success regarding learning and motivation that soon new software systems were adapted to meet their needs. Also teacher-student relationship improved. In the year 2003, The emergence of new free software systems that allow better interaction with students made us abandon the use of WebCT and to substitute it with other platforms
3. **Classroom methodology settlement and Moodle site.** At first, it was difficult to know which program could replace WebCT. The first difficulty was to get a program that could adequately replace WebCT. The second was to adapt a course that was taught in a conventional manner to a most innovative way. The use of tutorials and better communication on line was a success.
4. **On-line class (AulaWeb):** AulaWeb is a program developed in the Civil Engineering School and at the Polytechnic University of Madrid. This program started in the year 2003 and worked well until the end of the year 2005-2006 and beginning of the year 2006-2007. One of the reasons to change platform was that the maximum documents that could be filed was 30
5. **Moodle:** Moodle is a CMS (Course Management System) and at the same time a LMS (Learning Management System) or Virtual Learning Environment VLE (Virtual Learning Environment). It is a successful and free platform since is an excellent tool to create dynamic web pages and is very focused on students. Being open code, thousands of programmers around the world have been gradually correcting its deficiencies. The Polytechnic University of Madrid trusts Moodle which is managed from the university servers GATE (Tele Education Cabinet) servers... The full use of this platform by the IETM group began in 2007-2008.
6. **Instant messaging:** Students could contact teachers more or less constantly at an agreed hour. Also, up to 40 students could meet simultaneously in a joint guidance counsel. The most important disadvantage was that students had to use their personal email address for instant messaging, since e-mail accounts from the University were not suitable for this purpose
7. **IP Telephone Systems:** Allows audio and video communication between teacher and student. Today any laptop, tablet or smart phone provides this service. Limitations are found exclusively in the fee prices of the mobile operators. Once overcame technical limitations, personal restrains had to be solved since some students were too shy to use this tool. That is why the video chat was dismissed from the outset, it was thought it might be too intrusive into the privacy of students even if the student himself called first
8. **Participatory chat Platforms:** Chat experiments were carried out with a topic in Moodle but we could not gather or encourage more than five students at a time.
9. **Using forums:** When teaching is at distance, this application is more appropriate. From the ECTS standpoint, concerning credit and scoring, it is better that the teacher encourages students to solve their doubts among themselves than the teacher himself. To encourage students by scoring their participation is a great success.

**10. Technologies to share information, notes, virtual classes, videos and others...** Although some experiments were carried out with web repositories, this alternative was considered obsolete soon and was quickly replaced by the use of podcast. Podcast is broadcasting philosophy of an Internet file that allow students to subscribe for free to a page that has RSS technology, and each time the issuer (the teacher in this case) brings something new, it goes straight to the student podcast manager. In this way the student can be subscribed to many podcast stations pages. When he opens his podcast manager it will appear a list sorted by subscription (according to the topic) with all the news. Files produced via podcast can be of any kind, we have issued specific audio files about several topics such as earthmoving machinery, video files, text in different formats, images etc. The use of podcasts for teaching began in the 2007-2008 academic year. Its main advantage was that it is a technology that can be used in many subjects and it is unthinkable that the student is constantly aware of developments in all subjects, but that would be feasible if it is a podcast manager the one that controls and runs the subjects. La utilización de podcast como material docente se inició en el curso académico 2007-2008.

Some of these strategies are detailed in [1]

### **2.3 Some rewards that encouraged us to continue**

In February 2002 we obtained the Educational Innovation Award granted by the General Foundation of the Polytechnic University of Madrid. Then, newspaper "El Mundo" was very interested in advances made by the team regarding educational innovation, and published two articles. The first entitled "The Total Engineer" full-page and reported on all these experiences up to then. The second, entitled "What do you bet that mine withstands better?" focused on a competition among student's teams on tower structures which were built, measured and designed by them. Thereafter, more innovative educational experiences were adapted to Technical Universities and in several subjects.

### **2.4 The introduction of the European Higher Education Area (EES)**

European ECTS credits (European Credit Transfer System) assess student's time invested to acquire the knowledge and skills of the curriculum. Each represents 25 to and 30 hours of learning. In addition to attending classes, laboratory or other teaching activities it also includes student's hour's commitment to study, seminars attendance, solving exercises, learning activities such as participation in educational forums, self-evaluation, and so on.

During this phase it looks for the best solution to improve:

1. Communication between teachers and students outside class.
2. Working systems and student participation both class and outside class
3. Share information, notes, virtual classes, videos and other educational materials.
4. Provide some distance learning sessions.

As above mentioned, in order to improve communication among teachers and students, we started with messaging programmes, IP to share desktops and files, chats and in the end Skype. In addition, we used forums for some topics.

While experience to deliver information such as notes, virtual classes, videos and other educational materials via podcast had been successful in some subjects which had been applied, this approach was abandoned to center all in one platform Moodle, already well established in the Polytechnic University of Madrid, integrating it with a twitter module

In large student groups it is essential self-correcting tasks, so is the implementation of most assessments with Moodle. It uses questionnaires from question banks or handles exercises and case studies through this platform. The system acts as an important support since the teacher knows the story of the student. However, experience shows that it is in Postgraduate studies when students really start to leverage the platform and significantly improve their performance, because even in the Degree they fail to acquire the record that would allow them to fully exploit the forums and take fully advantage of the platform.

In this phase, regardless technology, the competitive testing between teams also provided an incentive and an effective tool for achieving competencies.

It should be understood that it is an error to identify educational innovation only with the use of new technologies.

### 3 INNOVATIVE “CONTINUAL TRAINING AND EVALUATION” APPLICATIONS FOR LARGE GROUPS.

After all these innovative search it began a new path of work aimed at ensuring the teaching and facilitate the evaluation of groups of more than 200 students. To this end, it was decided to explore the possibilities offered by:

1. The Moodle platform. When the number of students is too high, it is difficult to carry out some activities at distance without the appropriate tools and strategies.
2. Forums with students was an excellent way out to debate topics raised in class. This offered new approaches to efficiently analyze student guidance in the net.
3. Use of tools such as Second Life, Skype and other software which allow a collective conference with students.
4. Expert lectures as another way of teaching. Admission from Moodle. those lectures are recorded and posted on you tube.

The idea of continuous assessment, with one or more activities per week, seems reasonable with small groups. However, for groups above 200 students, it is required a good method organization if we are willing students success and pass the exams.

Proceedings were carried out in two ways:

- Activities on platform
- Live activities

Activities can be resumed as follows:

<u>Test Type</u>	<u>Effort and effectiveness Degree</u>	<u>Rating method</u>
Questionnaires in Moodle	High initial effort, continuous effort low, high efficiency.	Direct rating
Videos	High initial effort, continuous effort low, high efficiency	Rate -activity associated
Forums	Low initial effort, average effort, high efficiency	Direct rating
Lectures by experts	High initial effort, continuous effort high, high efficiency	Rate- activity associated
Seminar in Second Life	High initial effort, continuous effort high, high efficiency	Rate- activity associated
Class Work Submission	Initial effort low, continuous high effort, high efficiency	Direct rating
Not corrected submission	Low initial effort, average continuous effort, average efficiency	Direct rating

Roll call in class	Initial effort low, continuous effort average, average efficiency	Direct rating
Competition among students	High initial effort, continuous effort high, high efficiency	Direct rating
Work submission	Average initial effort, continuous effort high, high efficiency	Direct rating

Table 1: Activities Summary in continuous assessment.

## 4 NEW EXPERIENCES

### 4.1 Progress in Second Life teaching

Some teachers or groups research have studied the possibility of providing support classes or seminars in virtual classes in Second Life. Researches regarding connections between Moodle and Second Life are very interesting. These are called SLodle.

At the "International Technology, Education and Development Conference" (INTED 2011), we presented a Poster [2] that describes how a student accepts teaching in virtual world according to resemblance with real world. Second Life similarity to real world is enough for the student's mind to perceive the seminar or class as he had attended personally the event, not as distorted so that the student would reject it as a reality caricature. From this point of view, Second Life is an optimal platform for teaching, using it in remedial classes, seminars, etc..

The IETM group has made three important contributions :

1/ It has been combined a Second Life classroom with reality, so in that some conferences have been held at a time in a real conference room, and in second life for students who could not attend. The classroom had a screen where the same images, as in the actual conference, were displayed. Same thing happened with the audio.

To create a SecondLife classroom with some similarities to reality, but in a relaxed setting contributed very much to encourage people to use remote conferencing.

2/ Since it was difficult to get some speakers come where the conference was actually held, the teacher would show the slides while the lecturer entered on-line and in real time to the room with assistants. The fact that there was at times some dialogue between teacher and lecturer made it more fluent and bright. Otherwise it can surface boredom and rejection from assistants. Regarding this it is important to encourage student's participation, asking questions and getting answers. It is important to avoid the feeling of distance in these sessions.

While the lecturer gives the lecture in the conference room, it is also taught in the Second Life classroom.

3/. Video recordings were performed both in SecondLife and in reality, and combined, along with images of the slides or videos of the real lecture, which gives rise to a complete video conference with assorted images of different environments, these videos are later placed on youtube

We have observed that, if the theme is wide-ranging, we have many visits to the link, but if the issue is specific to a special subject or topic only students would visit it.

### LARGE GROUPS TEACHING

The IETM group researches on how to perform continuous assessment activities every week to larger groups of students without overrunning teachers with work.

- Creating items very fast and easy to correct, so that frequently the teacher has not to assess himself.
- Task automation. Some in content management systems such as Moodle

Both solutions are fit for student's learning. Positive results are observed in student's grades.

## 4.2 CROSS-CURRICULAR THEMES

From September 2010 till now, the IETM group has focused on the development of generic skills.

After a close study, it was decided to focus on the following skills which were worked among others in the following activities:

Developed skills	Digital Journal	Cultural Posts
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\* Tools: Competence for learning and training.

- Work in Group	average	high
- Independent learning	high	average
- Analysis and synthesis	high	average
- Organization and planning	high	high
- Decision-making	high	average
- Foreign language knowledge	low	high
- Right understanding and text writing	high	average

Social abilities: Aptitudes for good social relationships.

- Interdisciplinary Teamwork	average	high
- Ethical Commitment	average	average
- Negotiation	average	high
- Personal Motivation	high	high
- Speaking and body language	low	high

Methodical: Performance Management and total overview.

- Adapting to new situations	high	high
- Creativity	high	high
- Leadership	average	high
- Innovation and Entrepreneurship	high	high
- Quality concern	high	high
- Project managing	high	high

Figure 2: Generic skills carried out .

Analysis of part of these strategies are developed in [3].

### 4.2.1 *The digital newspaper*

The IETM group noticed that some students had difficulties understanding texts, extracting main ideas and writing. Thus, the group deliberated on how to improve these cross-curricular topics. It was decided that students had to read some news from newspapers or news agencies and from these readings write them later their own article.

It was thought that by creating a digital newspaper, students would exploit new competencies. See figure 2

In order to create the digital newspaper we got a domain for the IETM Group (<http://www.tertiomillennio.eu>) and settled on a free hosting server, Joomla 1.6, an appropriate template for a digital diary.

To choose the newspaper name, there was a competition among students. The winning option was “OPMind” which matches with the idea of “open mind”. Capital letters O and P would stand for “Obras Públicas”. Same thing with the logo.

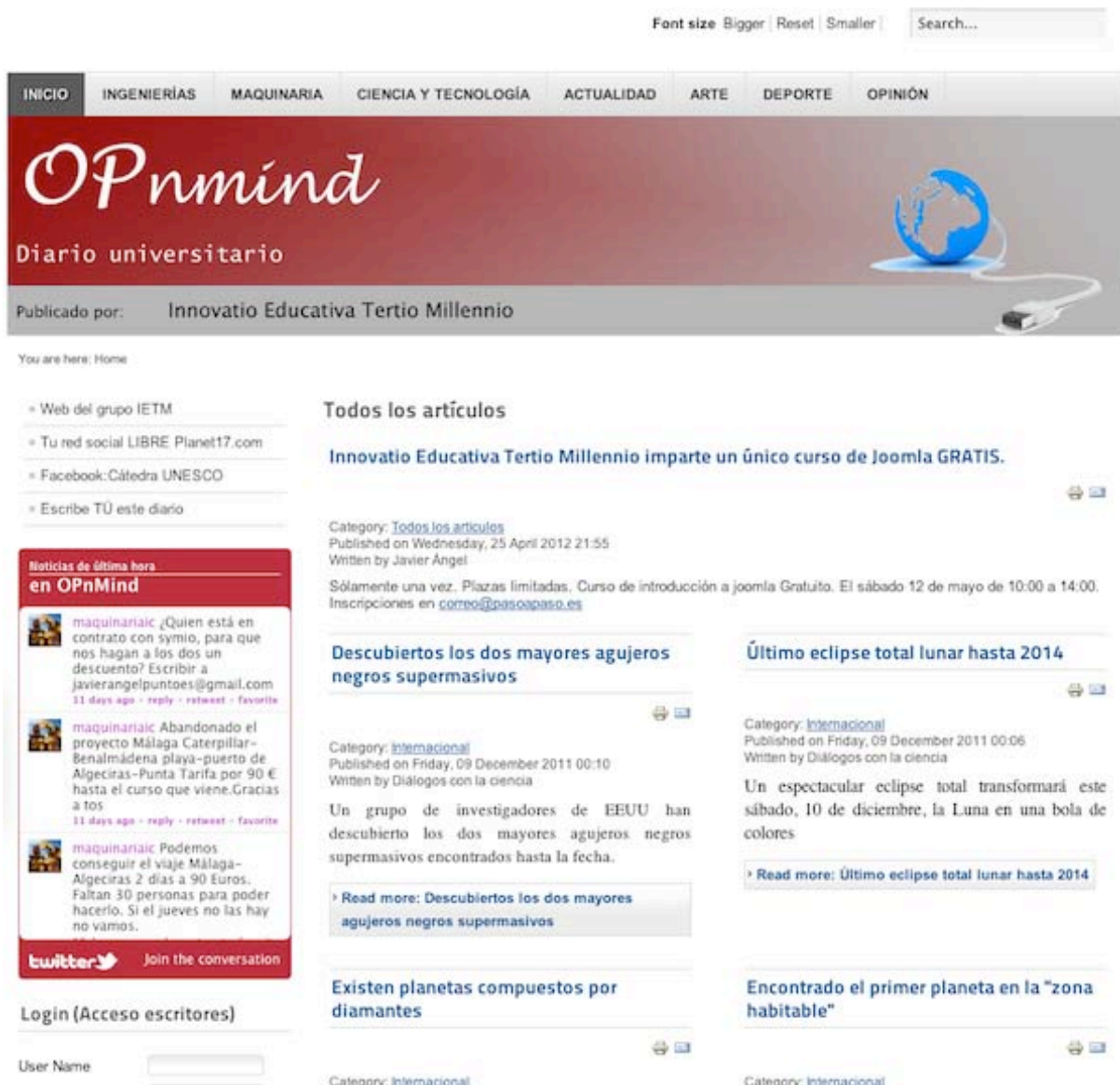


Figure 3: Digital newspaper

The main purpose is that students learn how to find information on a topic, compare different sources and their reliability, fully understand the news, write about it, develop and / or choose images to illustrate it, write down an essay and edit it digitally. This work will be evaluated and graded in continuous assessment.

Current and up-to date news combined with graphics, pictures, diagrams etc, are very much appreciated

Students are the writers of this newspaper. It accepts any topic except the University.

The Machinery teacher takes into account journal publications on his subject. In this field of study it is requested at least the following amount of news::

- Machinery: between 30 y el 50%
- Engineering: between 20 and 40%
- Science: Between 10 and 40%
- Technology: Between 5 and 30%

Any other theme: Between 10% and 40%

#### ANNEX 1 (Registration):

To publish in OPnMind you only have to write an email to: [becario.maq.op @ gmail.com](mailto:becario.maq.op@gmail.com) with your full name, your email address and your twitter user name to the newspaper, if you want to publish news in the twitter module, later you will receive an email with your username and password.

#### ANNEX 2 (Twitter Module ):

Students who wish may incorporate a twitter account at twitter module of digital newspaper. They must notify the name of the twitter account at registration. The holder will include the twitter account to the twitter digital newspaper module. Since these news are not yet wide spread, it will be taken into account how “up-to-the minute” they are.

#### ANNEX 3 (Notes):

Note 1: When writing news it is requested that controversial or polemic news (usually national international news) should be as unbiased and respectful as possible.

Note 2: It is FORBIDDEN to pour any opinion on any member of the University Community

Note 3: All news related to the university community should be approved by Javier angel. It is not the purpose of this publication to create University disagreements.

Topic	TOTAL	Students	Teachers	Radio Program
ACTUALITY	16		5	0
ART	3	3	0	0
SCIENCE AND TECHNOLOGY	58	13	15	31
OTHER	48		48	
GENERAL	31	20	11	0
SPORTS	6	0	6	0
ECONOMY	2	0	2	0
ENGINEERING	6	5	1	
CIVIL ENGINEERING	10	9	1	0
INTERNATIONAL	83	2	10	71
MACHINERY	18	8	10	0
NATIONAL	39	0	8	31
HOBBIES	12	6	6	0
OTRHER ENGINEERING	3	2	1	0
POLITICS	4	3	1	0
TOTAL	339	71	125	133

#### Charter 4: OPnMind articles written in 2011

As an anecdote: Once a student wanted to write in the digital newspaper under a pseudonym. The teacher explained that the idea of the diary was to be open and communicative but if she was willing to do so, it was up to her and it was no problem. Finally, the student decided to write with her own name.

#### 4.2.2 Intercultural exchange

In the new Civil Engineering degree students have some subjects in English but don't have a specific English course. Therefore, they have an acceptable level of English which they gradually increase in extra curricular classes or with trips abroad. On the other hand some students have not been



exposed to other cultures. In order to help those students we have created this intercultural exchange.

The first thing to do in this intercultural exchange is to contact an institution in a foreign country, which really belongs to another culture, which has 15 persons or 15 groups of people interested in learning about the culture of the other "Partner".

In the first meeting, we explain to each team that they must choose a thing that they consider representative of their culture, with a limited weight (eg 300 g) and a limited price (eg 10€uros). Then it starts the search of the thing. Then, leadership, and negotiation with other groups is necessary. In the event that a group does not reach 300 g of weight, it can negotiate with another group that has exceeded the weight.

In the second meeting the package will be set with each 15 items duly labelled and with a short letter of presentation. Total weight of the package should not exceed 5 Kg. Afterwards, each partner sends the package

When the packet arrives, to the other partners, it has to be convened a day and hour to open the parcel simultaneously. It is important to choose well the timing to take into account time zones differences. Once in touch, greetings and opening the presents is a party. Each person explains the reason for choosing that particular thing and dialogues with members of the foreign group. More or less it takes 5 minutes per item and in the whole about 2 hours and a half.

It is a very rewarding experience. Some participants make new friends, broaden their minds and are encouraged to visit other members of the groups.

### **4.3 Platforms combination**

We have reached a certain level of expertise regarding our investigation field. In addition, we have given conferences at several congresses regarding our experiences. Our courses on learning innovation are offered and promoted in our website [www. Tertiomillennio.es](http://www.Tertiomillennio.es).

For the year 2012 we have this courses:

- 1/ Creation and programming of dynamic web pages
- 1.2/ Creation and programming of Joomla websites
- 2/ Creation of multimedia material. Podcast.
- 3/ WEB teaching as complement to classroom classes and at distance seminars.

For the year 2013 next the courses will be added:

- 1.3/ Creation and programming of Drupal websites.
- 1.4/ Creating and programming WordPress websites .

## **5 CONCLUSIONS**

Since 2000, the IETM group has been making all kinds of investigations concerning educational innovation.

In the last stage:

1/ Teaching in Second Life while at the same time there was a web conference going on. (Above widely explained)

2/Teaching methods development that allows continuous assessment combined with activities all week for large groups of students (over 200).

3/ Enhancing Cross-Curricular aspects: Mainly:

3.1./ through an online written journal by the students. Digital paper.

3.2./ Intercultural Exchange. This activity involves a package exchange. Participants will connect and intercourse on line.

Up to now we have opened several investigation branches. Our knowledge has been highly appreciated in teaching innovation courses.

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