

# NEW TECHNOLOGIES FOR EDUCATION AT UNIVERSITY OF PORTO: EXPERIENCES AND CHALLENGES

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## Abstract

The aim of this work is to give a brief account of an ongoing work at the University of Porto (U.Porto) which aims to promote and disseminate the use of Information and Communication Technologies (ICT) inside all the educational activities and also encourage the development and use of innovational services.

Based on this innovation goal through its unit for New Technologies in Education (NTE) the University adopted in 2003 a pilot-project to develop pedagogical contents for Learning Management System (LMS). The main idea was to complement face-to-face classes with a online teaching/learning component - in this paper the online courses should intended a blended-learning support for presential courses. The most important and more common pedagogical support gave by the office to those teachers interested in blended-learning methodology are the personal work meetings with them, usually followed by presentations of the platform to the students on their first presential class. After a few years with more than 774 online courses the NTE office, composed of a multidisciplinary team of eight persons, gives not only technical and pedagogical support to the academic community that is using the institutional e-learning platform – Moodle U.PORTO – but also makes available other services, encourages and supports their use.

Despite all the obstacles inherent in the implementation of a Computer-Based Assessment (CBA) strategy in a traditional and large university like U.Porto, the office is engaged in supporting e-assessment. Although the online assessments that have been taking place are individual experiences, they are of major importance since they allow the identification of problems and definition of the necessary improvements. All the online assessments have been performed in Moodle.

Aware of the importance of e-contents as a way to enhance students' knowledge the office provides a service of educational multimedia objects development for teachers that have online courses. The objects are developed by a small sub-team and the most common types of multimedia contents requested are videos sessions, animations, graphic works, and some simulations.

A free of charge videoconference studio and a telepresence room, both managed by NTE, are also available to the academic community. The persons from the office who are responsible for those infrastructures also provide technical support for Educast – software for web broadcast – and Colibri – software that allows web conference. In the last few years the office have presented and is trying motivate more discussion on pedagogical issues like digital accessibility or the viability of e-portfolios as an instrument to meet the changing needs of teaching and learning. So to improve the knowledge and performance of teachers and students in ICT issues – and therefore promote the NTE services described above – the office has conducted continuing education courses, workshops and small events some of them with guest speakers experts in areas such as comparative judgment assessment, e-assessment or electronic portfolios.

The feedback obtained over the years has shown that the existence of an office that works so closely to the academic community facilitates not only the implementation of projects like these but also allows create foundations for more innovation.

Keywords: ICT (Information and Communication Technologies), education, innovation, blended-learning, e-learning.

## 1 INTRODUCTION AND CONTEXT

The University of Porto (U.Porto) is currently the largest education and research institution in Portugal. Close to 31,000 students, 2,400 teachers and researchers along with 1,700 administrative staff

attends its 15 schools – 14 Faculties and 1 Business School – and 69 Scientific research units, spread across 3 university campuses located in the city of Porto. The University provides a variety of courses, covering the whole range of study areas and all the levels of higher education. At the moment, U.Porto is offering teaching solutions practically for everyone with over 700 training programmes per year from degrees to continuous professional training.

Given the changes and the dynamics of today society, where information and knowledge are the main driving factors of development, in the last years the University has been focusing in providing more quality and it is investing on research and new technologies. For understandable strategic reasons the New Technologies in Education (NTE) unit play a focal role in this mission.

The main purpose of this paper is to give a brief description of an ongoing work at U.Porto, a work that started with a small project coordinated by the NTE and end up being an important service at the University.

## 1.1 “e-learningUP” project

Implementing an e-learning project in a large, spread, and traditional university like U.Porto was a complex task that involved a large number of stakeholders like directors, teachers, students, administrative and technical staff. Although we can now find some similar reported experiences, for example in University of Sidney [1], along the years it was necessary for the University to find its path for solving constraints in the development of e-learning implementation [2], [3].

On the school year 2003/2004 the U.Porto started “e-learningUP”, a pilot-project to develop pedagogical contents and activities integrated on a Learning Management System (LMS), so the main idea was to start implementing an e-learning component as a way to support the face-to-face classes, redesigning Teaching and Learning (T&L). By that time the NTE unit was created to coordinate this pilot, and encourage and assist e-learning and/or blended-learning initiatives.

In the first year of the pilot-project 7 Faculties, 23 teachers, 20 courses, and about 2,000 students were involved. The initial awareness was to concentrate on the pedagogical online contents to be developed and not on the know-how of technologies used. The results obtained at the end of this first school year (2003-2004), and reported in case-studies by the teachers who redesign their teaching strategies taking into account an e-learning component, were good indicators to motivate other teachers. The presented results allowed the identification of some constraints and demarcated the end of the pilot.

During the 5 years of the project – that last till 2007/2008 – several LMS were tested.

Aiming the T&L improvement by using new technologies and blend them with the traditional face-to-face classes, the following years – with a growing number of online courses (Table 1) – demonstrate that even though teachers are not technology experts they were capable of rethink and adapt their methodologies, create e-contents and use a LMS without technical expertise. It is important to explain that by online courses it should be intended an online component to support the presential courses: blended-learning (b-learning).

Table 1. The “e-learningUP” project numbers

School Year	Faculties	Online courses	Users	LMS
2003/2004	7	20	1,000	WebCT CE
2004/2005	14	100	4,300	WebCT CE, Luvit
2005/2006	11	200	5,000	WebCT Vista / CE, Luvit
2006/2007	13	300	8,600	WebCT Vista, Moodle
2007/2008	14	400	13,000	WebCT Vista / Moodle

Since the beginning of the project many actions were taken to promote, disseminate and motivate the improvement of T&L process, like annual seminars and an internal award.

### *1.1.1 E-learning annual workshop*

The first e-learning workshop was organized in the end of the school year 2003/2004 an intended to be an instrument to disseminate the work done by teachers involved in the pilot-project. Because this first seminar wake up and encouraged many more teachers to use technology to support and complement T&L, the NTE unit decided to do one e-learning workshop every end of school year.

The workshop is essentially an event by and for the academic community with the following purpose:

- Advance the use of the new education and communication technologies;
- Create an academic community that shares common interests;
- Encourage the use of electronic resources – Internet – in the process of T&L;
- Evaluate the interest of e-learning in improving the quality of education.

These workshops have been showing a more creative use of different features of e-learning platforms, not just to better organize and deliver content but also to monitoring the student learning process, develop their collaborative skills, stimulate self-assessment and better measure the knowledge they have acquired.

### *1.1.2 Excellence Award for e-learning*

In 2004 U.Porto created an internal Excellence Award designed to distinguish the teachers who use e-learning platforms at the University with a proper pedagogical strategy in their teaching activities during the school year [4]. The main goal of this award is to promote good practices in the teaching and learning (T&L) process and stimulate and recognize the use of educational technologies in training activities conducted at the University.

The case-studies that the candidates have to submit are presented at the E-learning Annual Workshop. The evaluation of the candidates work in the e-learning platforms is made by a group of permanent judges that takes into account factors like e-contents developed for the online course, usage of collaborative and communication tools, innovation in contents and T&L methodology adopted.

## **1.2 From a project to a priority service**

With the project running, NTE extended their support to various areas. Always aiming to support users in the use of Information and Communication Technology (ICT), both as regards the creation of educational contents both in the use of e-learning platforms, the unit start offering other type of support concerning ICT in the teaching/learning process to promote good practices related to e/ b-learning. Soon the teachers were not only using an LMS with the unit support but were attending courses offered and trained by the unit, requesting support in the creation of multimedia educational objects, required support in the recording and dissemination of lessons.

During the project many LMS were tested, there was a concern about finding not the perfect but an efficient tool. Currently the U.Porto uses Moodle – official name of the platform is “Moodle U.PORTO” – a free open-source web application that can be easily used by teachers to create online courses. Because is an open-source solution it allows the NTE engineer responsible for administrate the all system to more easily solve problems, develop some modules and integrate functions. One of the major steps done in Moodle U.PORTO were the integrations with the University Information System – SiGARRA – that all Faculties use (Fig. 1):

- Single-Sign On (SSO) for students, teachers and staff: each person if authenticated at SiGARRA can now from its personal institutional page access Moodle U.PORTO;
- Grade book: teachers can now import automatically from Moodle U.PORTO to SiGARRA the students grades in all activities, including online exams;
- Summaries: for administrative reasons the teachers are obligate to insert at SiGARRA the courses summaries, and for a matter of course content organization they requested NTE to integrate this item so that they don't need to replicate this information in Moodle U.PORTO,

so at this moment the e-learning platform push the summaries for each online course from SiGARRA.



Fig. 1 - SiGARRA interface: a student user page at Faculty of Sciences

In the last academic year, the NTE unit registers 974 courses at Moodle U.PORTO, 838 teachers and 36,684 students (Fig. 2).

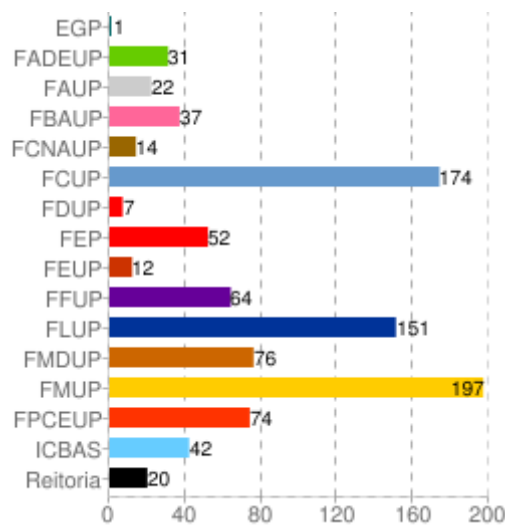


Fig. 2 - List of courses per Faculty (plus Rectory) that used Moodle U.PORTO in 2010/2011

At the end of “e-learningUP” after seeing that the goals marked were achieved and overcome, and after 5 years production of several pedagogic materials, the initiatives created therefore continue to take place and the number of teachers and online courses still growing naturally. The huge effort token by the NTE unit and the experience acquired in the use of new technologies applied to education, and now with a significant number of teachers looking for their support to evolve and improve teaching methods, it was clear to the University that the project must continue.

We can now say that the “e-learningUP” project as the trigger to build a solid service at U.Porto that intend to promote the use of technology to improve teaching methods and enhance students learning.

That service is assured by the NTE team that strives to provide a quality service and with the trust that has been gaining over the years allows a close relation with the primary target: the teachers.

## 2 PROMOTING EDUCATIONAL TECHNOLOGIES

### 2.1 Pedagogical and technical support to the academic community using the Learning Management System

The main activity of the unit is the technical and pedagogical support to teachers wishing to use the e-learning platform as a complement to their face-to-face classes. The role of the unit includes not only the training to provide a proper use of the platform tools, but also some pedagogical advice.

How to structure my course? Which contents should I publish online? How to interact with my students? How to develop collaborative and assessment activities? These are some frequently asked questions which the unit daily responds.

The LMS adopted by the University and since 2009/2010 the only one available is Moodle. On the last school year, in 2010/2011, Moodle U.PORTO (Fig. 3) already registers 974 online courses.



Fig. 3 - Moodle U.PORTO interface (<http://moodle.up.pt>)

All the teachers from U.Porto can request this service by filling a form at the NTE unit portal (<http://elearning.up.pt>) with some course data. Because Moodle U.PORTO is partially integrated with SIGARRA, the information system that every Faculty have where all courses and members (students, teachers, and staff) are registered, the courses and their users are automatically created in the platform.

To create an online environment consistent, intuitive, and more important with pedagogical relevance – allowing more autonomy in the student learning process outside the classroom – the NTE every year provides presential and online training courses related to Moodle features and online tutoring. With these courses the unit wants to ensure that the teachers have a clear idea on good practices to avoid the creation of courses that are simple repositories.

### 2.2 Computer-Based Assessment

The U.Porto has an ongoing e-learning project since 2003. The project, supported by the NTE unit, trained teaching staff in the use of new technologies in their daily pedagogical activities with students.

This previous experience with technology, either in the classroom or thru the e-learning platform, allowed the teachers to take the leap into assessment practices using the Moodle platform.

They extended this experience to formative and summative evaluation, using electronic tools to simplify students' assessment.

Computer-Based Assessment (CBA) was a natural evolution to these teachers: they had accumulated experience given by paper-pencil exams, and they have now the skills and knowledge to work with new technologies in the pedagogical process [5]. The University was already using Moodle for designing pedagogical activities like delivery of contents, discussions, assignments, which led automatically to think in expanding the use of Moodle to online evaluation.

Trying to go further, this time combining two areas of education and technology – e-learning and computer-based tests – in 2007 the NTE unit started an important project that consisted in implementing online assessment on campus using the University LMS – Moodle U.PORTO.

On the school year 2007/2008 the first online summative examination in a large scale using Moodle U.PORTO was taken. 409 students were successfully examined in the computer and had the immediate grade feedback on screen after submitting the exam.

This first summative assessment allowed the technical and teaching staff to identify several issues that need to be solve: number of computers available; classrooms with proper physical conditions for at least one hour examination period; security issues; and user identification issues. The role of the NTE unit was not only to support the teacher concerning how to create an online exam using Moodle, but also how to face and solve these problems using the tools available.

For this first experience the NTE unit and the teachers worked around the problem deciding:

- to use 3 classrooms each one with computers connected to the Internet in a total of 45;
- every 60 minutes groups of students were distributed by the 3 computer rooms;
- the Faculty technical local staff assured some security issues - the network was blocked only to access the faculty information system and Moodle U.PORTO, and the IP addresses of the computers were delivered to the NTE team so that the assessment would be set up only to be open by these machines.

The students' feedback was positive and the teachers were pleased with the fact that at the end of the day one of the hardest part of the work – marking and grading - was done. This experience allowed identifying the strengths and problems of online assessment at U.Porto and the dissemination of results aroused the interest of other teachers who already wanted to use online assessment but did not know where to start.

In the following years the number of teachers that used CBA has grown. The large number of students, time spent on the process (since development to classification), teaching staff lack of training and autonomy in the process and inadequate methods relating to new paradigms of T&L are current problems that the University face [5], and online assessment presents itself as a possible solution. However, despite the fact that CBA is now a more common activity at U.Porto and the NTE supporting team has now an intensive knowledge in this area, there is still much work to be done.

The extension of a project like this to the entire campus presents itself as a difficult task, but still not impossible! There is the need to train the academics to ensure the quality of the exams, regarding things like the questions construction, scoring, instructions and marking; train the Faculties technical staff in procedures to prevent cheating; design rooms with a considerable number of computers prepared for online assessment. Another important aspect is the acknowledgement that Moodle can successfully be used to perform online exams but it is not an assessment system. It doesn't allow a more complex exam construction failing several times in the test assembly phase and it also doesn't allow an easy statistical analysis. It is important to continue the research in this area and also explore other computer assisted assessment approaches in the pedagogical activities of teachers at U.PORTO.

### **2.3 Development of multimedia contents**

If in the last years the number of online courses grows, on the actual educational scenario where technological change is increasing is mandatory for teachers to adopt new methodologies of T&L. The NTE unit wants to highlight the importance of multimedia learning objects as a tool to improve and enhance students' knowledge [6]. However, create educational contents to support the T&L process is more than make digital documents available at the e-learning platform. Therefore, thinking about improving the students learning outside the classroom, as well as their autonomy, the NTE offers the

teachers a free service for developing multimedia learning objects. The types of products developed are animations, simulations, videos, or graphics.

Only the teachers that have online courses at Moodle U.PORTO can request this support, because is a free of charge service and regarding the fact that the unit is composed by 8 persons and just 4 are able to develop multimedia objects, it is important to decided what would be a priority. All the contents to be developed have to be used in the online course.

The idea was a success and many teachers look for help trying to develop e-contents that easily simplify the study of some complex subjects. However, a multimedia educational resource should provide more autonomy on the student learning process, allowing self-training and assessment, and if many teachers have ideas the reality is that the majority don't have any idea how to apply it. For that reason it was necessary to establish a procedure for this service. Everything starts with an online form that the teachers need to fill to request the service. In that form they have to specify the type of content they want to be developed, expose the idea/ concept and explain the added value that this content will have in their teaching and how we will help the student learning process. After receiving this form the NTE unit taking into account values like the pedagogical relevance of the content, reusability, human resources available and team technical expertise, decide if is possible or not to realize it.

## **2.4 Video services**

With the support of the NTE unit the members of U.Porto academic community can use the video services available for pedagogical purposes. The unit advises on the best way to proceed with the process according to the type of work requested.

### *2.4.1 Videoconference*

The U.Porto offers to the academic community a range of options concerning videoconference systems:

- Videoconference studio

A multifunctional space that allows pedagogical scenarios using the videoconference infrastructure installed. In this studio it is possible to have at the same time several persons participating in a videoconference session.

- Telepresence room (HD Douro Room)

The HD Douro Room has a system compatible with the traditional ones but it is prepared to increase the face-to-face sensation of the users. This equipment is simple to use and is a good solution to formal situations where the eye contact and body language is an important element. The environment of the room allows a more comfortable session and creates an "immersive" sensation.

- Portable HD videoconference system

To complement the videoconference services there is also available a portable videoconference system that offers a solution to space and mobility problems. With this portable equipment it is possible to improve the use of videoconference in each U.Porto faculty and easily disseminate and encourage the use of this technology in the classrooms. The necessary support for the usage of the equipment is assured by the NTE.

### *2.4.2 Web conference*

The web conference platform adopted by U.Porto is Colibri and it offers a collaborative environment with some tools that simplify the teacher work and allows not only on-line teaching classes – that can be reviewed later – but projects or workgroup meetings between teachers and/or students. This web conference platform is integrated with Moodle U.PORTO.

### *2.4.3 Lecture capture system: Educast@fccn*

Educast@fccn is the U.Porto lecture capture system available in which the lessons can be recorded and distributed more easily. The central system – managed by the Portuguese National Research and Education Network called *Fundação para a Computação Científica Nacional* (FCCN) – does the necessary post-processing to make these lessons available to students on the Internet, providing a range of video formats with the possibility of instant publishing. The NTE unit helps the production and also gives technical training to the Faculties local staff as a way to promote the use of the

Educast@fccn portable audiovisual kit in the classrooms. Concerning this service the NTE team supports the academic community in two ways:

- Content production in studio

It is used a room prepared with the audiovisual equipment and the NTE team responsible for the video services gives all the technical support.

- Usage of Educast@fccn portable kit

The role of the NTE unit here is to provide the training to the local staff. The University has two portable kits that can be requested by the academic community for educational purposes. With these kits there is a broad autonomy, especially for the teachers, and with the support of the local staff it is possible to do all the production and publishing in any Faculty.

#### *2.4.4 Video record and edition*

One of the video services requested by the teachers is the recording and video editing of classes or pedagogical events that they intend to make available for the students at Moodle U.PORTO courses. If the session to be recorded has actually a pedagogical interest the NTE video team not only support the recording and post-production but if requested it is possible to provide real time streaming. However, because of the time involved in this type of work process this service depends of the NTE human resources availability.

## **2.5 The new challenges**

Because of the constant evolution of the technology and the appearance of new questions relating to the way the Higher Education Institutions (HEI) are responding to the new needs of students and facing new educational contexts, the NTE unit in the last years have been taking some steps regarding issues that arose from a range of new ideas on how to improve the students learning experience and the quality of the teaching. The permanent goal of the unit is to include the teachers in all the possible discussions about pedagogic and paradigmatic questions regarding the use of new technologies in education.

### *2.5.1 Continuing Education courses*

The NTE unit commitments with Continuing Education (CE) online courses is a response to the needs of updating knowledge and develop new skills by multiple audiences and is a way to promote the concept of lifelong learning in a traditional university like U.Porto. CE courses in an e-learning model for its versatility and suitability for a worker and/or student-worker audience allows responding to the training needs that often cannot be achieved in a face-to-face class because of the restrictions of this type of audience.

In recent years the unit not only promotes among the teachers the development of CE courses but provides some online CE courses in different areas that relate technology and pedagogy: how to build courses using Moodle, use of web 2.0 in Education, digital portfolios and many others.

### *2.5.2 Accessibility*

Due to efforts made by the State in the last decade the universities face a new challenge as they need to deal with an increasing number of disable students. Unfortunately the majority of teachers and staff working in HEI in Portugal are still not aware and prepared to deal efficiently with those needs.

In 2008 the U.Porto decided to commit itself with accessibility by approving its Students with Special Education Needs Regulation and starting by this way a new phase that intends to build an academic community more aware of the inclusion practices and development of accessible contents. But not only the institutional policies matter, in order to make things happen it is important to give the necessary information and educate those who will have to deal with these situations every day.

In 2009, the NTE unit started to further promote research concerning accessibility. This ongoing effort aims to involve the whole academic community by raising awareness through information, digital guides and specialized training on digital accessibility.

Today the teachers are a sort of learning technologists [7] but the true is that they have enormous difficulties when they real need to face for instance a deaf or blind student on their class. So with the aim of helping the U.Porto community the NTE team went forward with some online training courses – “Accessibility in classroom setting”, “Accessibility: concepts and basic rules” and “Digital contents in

DAISY format” – and production of good practices guidelines documents. All the materials are created and chosen based on assumptions that most of the teachers and staff are not aware of their important role in providing accommodations for those students with special needs.

### *2.5.3 Promoting projects and seminars*

In recent years the U.Porto has stake on a sustained modernization of their processes by investing in critical areas to promote development and innovation that intends to create conditions to increase the employability and diversify students' career choices. Because being innovative also means to improve the quality of training and promote discussions, looking ahead the NTE unit has been involved in international projects and conferences to open doors in T&L, especially concerning e-learning and blended-learning methodologies. At the same time, a significant number of teachers feel the increasing need to explore and test more educational scenarios as a way to improve their and the students e-learning experience.

So besides the e-learning annual workshop, the unit decided to start organizing seminars - some of the seminars that already took place had an invited expert in that area – on the use of digital portfolios as an evaluation tool, online assessment, comparative judgment assessment, copyright and others. One of the difficulties in organizing this event relates to the costs, because if logistics it is ensured by the unit team, the participation of a guest speaker always has costs.

## **3 CONCLUSIONS**

The increasing use of new technologies in Education has long been expected and with the growing competitiveness in the Higher Education market it was obvious that the University would have to evolve to that level.

The NTE unit mission is to disseminate and support the use of ICT in the teaching/ learning process through:

- Technical and pedagogical support for all the teachers that want to develop educational contents to be used in their online courses at Moodle U.PORTO;
- Monitoring, advising and promotion of good practices related to e/ b-learning, distance learning and continuing education;
- Development of training courses to increase teachers know-how related to technologies (Moodle, CBA, Videoconference tools, and others);
- Development of pedagogical contents in multimedia formats;
- Participation in European projects where technology and educational questions (good practices, strategies, assessment, etc.) play a role;
- NTE staff training to update their knowledge in ICT applied to Education (most of this training made during participations in international/national projects and conferences);
- Students hands-on sessions organized with the aim to support some of their learning activities.

The U.Porto never intended to become a distance learning University, but to promote the use of technologies to increase the quality of T&L and place itself as a good option for those searching for quality and innovation. The challenge is enormous but realistic, and for obvious reasons the NTE unit plays an important role promoting, supporting and monitoring the e/ b-learning evolution in the academic community and paying special attention to new areas such as CBA, Open Content and mobile learning. The NTE unit knows that do this work with a small number of collaborators is difficult but believes that is not impossible.

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