

Monograph “The Economics of E-learning”

ARTICLE

Describing E-learning Development in European Higher Education Institutions Using a Balanced Scorecard

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Abstract

This paper has strong links with the European Commission's statement on the initiative “E-learning: designing tomorrow's education”, adopted on 24 May 2000. It tackles the question of how Higher Education Institutions (HEI) follow the development of and manage their e-learning activities. This emerged in work package no. 3 of the eLene-EE project (Economics of e-learning, 2006-2007), which examines the economic models of e-learning.

With the help of a Balanced Scorecard (BSC), designed by e-learning practitioners, and researchers in economy and management, the e-learning development of European institutions is described over a three-year period (2004-06). The BSC shows what is prioritized and how HEI act using four main dimensions: Financial, Customers/Students, Internal Business Process and Learning/Growth. Four examples, from the universities of Lublin (on behalf of the Polish Virtual University), the Centro METID in Milan (Politecnico di Milano), and the universities of Nancy and Nice Sophia Antipolis, show different stages of development, different strategic choices and underline common aspects that could be used to design e-learning evolution models in European HEI.

Although this approach is focused on information in the HEI management field, it suggests firstly that there is a need for more research and for the elaboration of theoretical tools to conceptualize trajectories of development, and secondly, the need for BSC to be extended to all areas of HEI in order to promote coherency of student education, research, continuing education and e-learning.

Keywords

e-learning, management, higher education, BSC, strategy, control

La descripción del desarrollo del e-learning en instituciones de educación superior de la Unión Europea mediante un cuadro de mando integral

Resumen

El presente estudio está estrechamente vinculado a la declaración de la Comisión Europea sobre la iniciativa “E-learning: el diseño de la educación del mañana”, adoptada el 24 de mayo de 2000. Trata la cuestión de cómo las instituciones de educación superior gestionan y siguen el desarrollo de sus actividades de e-learning. Este tema salió a la luz en el paquete de trabajos n.º 3 del proyecto eLene-EE (La economía del e-learning 2006-2007), que examina los modelos económicos del e-learning.

Con la ayuda de un cuadro de mando integral, diseñado por practicantes de e-learning e investigadores en economía y gestión, se describe el desarrollo del e-learning de las instituciones europeas a lo largo de un periodo de tres años (2004-06). El cuadro de mando integral muestra a qué aspectos se da prioridad y cómo actúan las instituciones de enseñanza superior usando cuatro dimensiones principales: financiera, clientes/estudiantes, proceso empresarial interno y aprendizaje/crecimiento. Los cuatro ejemplos, de las universidades de Lublin (en nombre de la Universidad Virtual Polaca), el Centro METID de Milán (Politecnico di Milano) y las universidades de Nancy y Sophia Antipolis de Niza, muestran diferentes estadios de desarrollo, diferentes elecciones estratégicas y subrayan aspectos comunes que se podrían usar para diseñar modelos de evolución del e-learning en las instituciones de enseñanza superior europeas.

Aunque este análisis se centra en datos del campo de la gestión de las instituciones de enseñanza superior, indica, en primer lugar, la necesidad de seguir investigando y de desarrollar herramientas teóricas para conceptualizar las trayectorias de desarrollo y, en segundo lugar, la necesidad de ampliar el cuadro de mando integral a todas las áreas de las instituciones de enseñanza superior para promover la coherencia de la educación de los estudiantes, la investigación, la educación continua y el e-learning.

Palabras clave

e-learning, gestión, educación superior, cuadro de mando integral (CMI), estrategia, control

1. Introduction

This paper has strong links with the European Commission's statement on the initiative “E-learning: designing tomorrow's education” adopted on 24 May 2000. This initiative, following on from the conclusions of the European Council in Lisbon, presented the principles, objectives and prospective actions related to e-learning, defined as the use of new multimedia technologies and the Internet, to improve the quality of learning and facilitate access to resources and services, such as exchanges and distance collaboration (European Community Commission, 2001). Following the study “Virtual Models of European Universities: e-learning in higher education” (elearningeuropa.info, 2004) ordered by the European Commission, eight institutions or consortia¹ co-operated to set up the

e-learning network “eLene”. They identified common strategic perspectives and prepared responses to the calls for proposals in the framework of the e-learning programme. eLene-EE (Economics of e-learning, 2006-2007) is the second application to a call for proposals; it considers the economic models of e-learning (OECD, 2005).

As part of this project, work package 3 (WP3) of the eLene-EE project has been looking at the management of the e-learning activities in Higher Education Institutions through the use of a balanced scorecard (BSC). This entails monitoring the changes and development of e-learning activities in universities. The three partners involved in WP3, the METID centre at the Politecnico di Milano,² the Polish Virtual University³ and the CANEGE consortium are all at more or less advanced phases in the development and structuring of their mod-

1. France: CANEGE, Italy: Politecnico di Milano, Germany: University of Bremen, Netherlands: University of Utrecht, Finland: Finnish Virtual University, Spain: UOC (Universitat Oberta de Catalunya), Sweden: University of Umeå.

2. Centro METID (Metodi e Tecnologie Innovative per la Didattica) -Politecnico di Milano.

3. Marie Curie Sklodowska University in Lublin, on behalf of the Polish Virtual University.

els of learning via the Internet. They clearly need to show, within their own institutions, how their e-learning activities are progressing. The partners in the eLene-EE group collectively decided to focus the study on higher education institutions and to adopt a resolutely managerial approach. The macro-economic aspect, of interest to financiers, will be dealt with using a bottom up approach. The idea is to use a set of data gathered at each university within the region, and in neighbouring regions, and possibly neighbouring states, to verify the governing dynamics (past and present) behind the development of e-learning. This decision was taken because, with the introduction of e-learning activities, there is a lot at stake for the future of higher education institutions, and there is an apparent lack of tools to monitor the development of e-learning activities. Management, based solely on an annual budget with a balanced distribution of resources, will be insufficient to have an accurate overview in an environment where changes will inevitably accelerate. So, WP₃ focused its efforts on a BSC approach.

Using the BSC elaborated in the eLene-EE WP₃, we describe e-learning developments in four European cases. They demonstrate different stages of development, different strategic choices and underline common aspects that could design e-learning evolution models for European HEIs. We discuss these observations within the HEI management field and in terms of future research.

2. Presentation of the BSC

Kaplan and Norton (1997) inspired the designing of the BSC, adapted for e-learning activities in HEI. They developed a scorecard that provides a balanced representation of the life of a company by combining the indicators from four perspectives: financial, customer, internal processes and organizational learning.

In the e-learning context, the BSC adapted the four dimensions detailed into specific indicators. The table below provides a summary:

TABLE 1: BSC of e-learning development in higher education

Financial
Proportion of expenditure of the establishment allocated to e-learning (general running costs, investment and maintenance of investment).
Proportion of profit generated by e-learning in relation to total profit.
Customer / Student
Proportion of students enrolled in e-learning/ Mixed formula/ enhanced face-to-face in relation to total numbers.
Proportion of instructors using e-learning/ Mixed formula/ enhanced face-to-face
Proportion of courses offered in e-learning/ Mixed formula/ enhanced face-to-face.
Number of complementary Internet services offered (administration, CROUS, library, leisure, etc.).
Internal business processes
Pedagogical matrix: Proportion of digital media available and rate of evolution per category in terms of media and tutoring offered.
Infrastructure dedicated to e-learning measured in terms of capacity and charge rate for the servers, network and staff.
Training: Proportion and average number of training hours followed by the student, administrative staff and teachers in the use of e-learning tools.
Degree of overall satisfaction with e-learning on the part of e-tool users.
Learning and growth
Degree of university participation in an e-learning related event (all types of communication).
Number of national or international e-learning projects organised by the university.
Number of new e-learning partnerships with public or private organisations.

The case studies in this paper give an opportunity to collect data and illustrate the use of these indicators. The way the WP₃ group worked was essential in this process. From a general question related to “Indicators of e-learning”, we became involved in a practical way with academics working to link competencies and to define indicators relevant to HEI level and also to regional, state and European e-learning policy”

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During the conceptual phase, we made continuing mutually agreed adjustments to the specificities of the situations of the partners and the defined objectives. We integrated dimensions relating to the quality of services provided to customers and some indicators of e-learning progression in society. We tried to identify the elements of its development. The objective of BSC was to highlight questions such as:

- How are e-learning and ICT uses progressing in our HEI?
- Have policies increased the number of e-learning students and the quality of the learning?
- What impact does the policy have on ICT use?

Adopting a bottom up approach focused on accurate data at the HEI level, the partners found it difficult to obtain the relevant data on their institutions. Over the three-year period 2004-2006, they set up one database for each year, with more than 100 basic variables collected at lower levels. In order to be as exhaustive and as flexible as possible, we chose the faculty level for our data collection. We then compiled the information at university level for each year and for each basic variable. Using these consolidated data, we were able to calculate the I1/I2 indicators and to represent them on graphs depicting their evolution in four dimensions.

The BSC is a tool for the measurement and management of performance (Radnor and Lovell, 2003) in public organizations in the field of e-learning. In this study it posed questions for universities and HEIs on several subjects. One was a definition of the usefulness of these institutions in relation to the country studied, which is not always clear; in these cases, the implementation of a tool to measure the impacts of e-learning did not appear to be a priority. The information that traditionally is available to management is rather general, whereas the methodology of the BSC requires well defined inquiries and accurate answers from the information system. This system represents the third difficulty we encountered. Sometimes, the data were required in more detail than available in the information systems, creating the need to identify and contact the person who could provide more extensive information. In many cases this was not a straightforward exercise but generally we had the co-operation of experts at the universities in seeking out the relevant data.

This situation should improve as European countries make efforts to improve the transparency of their policies and strategies. For example, in France, there is ongoing

implementation of LOLF (French Organic Law of the Financial Law), one of whose objectives is to bring together cost accounting data and qualitative information to enable the monitoring of national policies in higher education, benefiting the public interest.

In what follows we describe the BSC and e-learning development in four European universities.

3. E-learning development of four European universities

The most important result of the WP3 work is related to institutions. Use of the BSC allowed decision makers to understand the history of HEIs and to design a coherent plan for their future. But the set of indicators also provides information that allows us to distinguish among European HEIs. The four institutions, that participated in the eLene-EE project, presented their own case studies at the conference in Paris in December 2007, and here we summarize the main elements. We begin with the establishments that took up e-learning activities less than six years ago and continue with those that have been involved in e-learning for more than ten years *i.e.* from at least the beginning of the period studied (2004-06).

3.1. Youngest institutions in terms of e-learning

3.1.1. Maria Curie Sklodowska University of Lublin

As noted by Chmielewski (2007), the Maria Curie Skłodowska University (MCSU) of Lublin was established in 1944 and has been steadily expanding its programme in order to meet the changing needs and standards of a leading European HEI. About 33,000 students are currently enrolled in courses offered by ten faculties in 30 different study programmes. The university employs approximately 1,800 staff. Postgraduate and doctoral study programmes are increasingly popular.

MCSU is the most recent university in our sample to introduce e-learning, for which purpose in 2001 it created the University Centre for Distance Learning (UCZNIKO). UCZNIKO is the university department responsible for organizing and running projects that involve online education. Its objective is to prepare, organize and run projects that involve the Internet in the provision of higher educa-

tion. The first project to be launched was the Polish Virtual University (PVU).

PVU was initiated in March 2001 by UMCS in collaboration with Academy of Humanities and Economics (AHE) in Lodz and ran till February 2002. PVU's main objective was the creation and the management of distance learning courses and to this end technology was developed for the production of the courses based on the latest achievements in the ICT field. PVU set up a team of people researching the theoretical, methodological and practical aspects of distance education. One of PVU's aims was to transfer knowledge from world leaders in the field to the Polish educational system. Its main objective was two-fold: to offer programmes and courses over the Internet and to promote modern teaching methods to support

traditional lectures. So far, UCZNIKO has developed four specialties online:

- 2002/03: in marketing and management, and in computer science, at bachelor's degree level at the AHE;
- 2003/04: in political science, at bachelors level at the AHE;
- 2004/05: in administration, at masters degree level at the MCSU.

With the introduction of BSC courses period, the trends in the type of students involved in e-learning changed. The sharp increase in 2005 and 2006 is not due to MA courses alone.

C.1. People involved in university e-learning			
	2004	2005	2006
Students	1.87%	12.31%	22.08%
Others customers	0.00%	0.00%	0.00%
Lecturers	0.93%	7.99%	16.46%
Administration	5.55%	5.55%	5.55%

Number of students involved in WEL

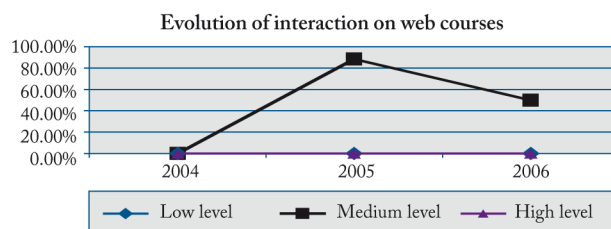
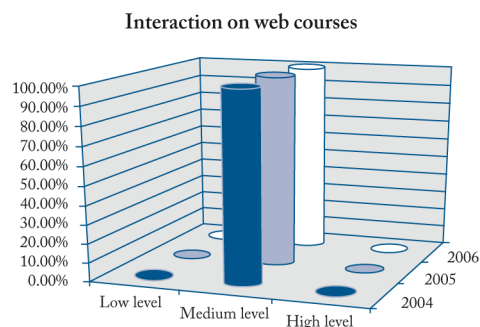
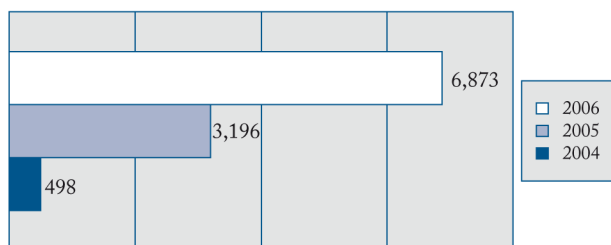


FIGURE 1: UCMS indicators for BSC courses, and data on customer and internal business process

In 2004, UCZNIKO launched its Virtual Campus project aimed at encouraging the use and incorporation of ICT by professors into traditional lectures and combining ICT use with traditional teaching methods. UCZNIKO promoted the use of ICT through this project. It also dealt with the critical question of the measurement of ICT ability in teaching and developed a system of training for professors who wanted to improve their knowledge on the distance-learning platform. Following a difficult start, the

UCZNIKO team decided that "agents of change" were needed – experts and enthusiasts in e-learning who could engender enthusiasm in others. A small group was set up and the Virtual Campus became a sort of spontaneous initiative of tutors, engaged in the project out of interest and not for any additional monetary reward. Now, in 2008, over 6,000 people are active participants in the Virtual Campus. The right hand side of figure 1 shows that this has been achieved with medium levels⁴ of interaction and

4. Offers a textual medium with a voice or video recording of the lesson and interactions, using tools such as a messaging service, discussion forums and/or chat rooms.

media input.⁵ The biggest increases in participation occurred in 2005 and 2006. The lower left hand side of figure 1, however, shows that all the degrees on offer are on Web Enhanced Learning (WEL), which means that less than 30% of study hours are distance learning. The MCSU has yet to diversify its distance education offer to Blended or Full Online learning.

In the other two dimensions, MCSU spent, on average during the period, 0.135% of its total budget and earned 0.065% of its total incomes. This is a small financial impact. In the learning and growth dimension, MCSU appears very dynamic in terms of new partnerships and projects developed, which stand at around 20 per year. The university lectures and researchers have also participated in many conferences, up to 80 per year during the period studied.

3.1.2. University of Nice Sophia Antipolis (UNS)

Since 1999, the University of Nice Sophia Antipolis (UNS) – the second ranked multidisciplinary university in France – has been committed to the development of ICT-mediated learning and the support of individual initiatives as well as collective projects (Garrot, Psillaki and Rochhia, 2007). In terms of funding, it has maintained both a bilateral dimension with the Ministry of National Education, and a multilateral one, with the setting up of networks to tender

for government projects such as French Virtual Campuses. Co-operation with other higher education agents has allowed UNS to gain organizational competences in the management of collaborative projects. Although by the end of 2003 few diplomas had been gained over the web, UNS has developed several mixed media resources and specific pedagogical approaches with partners for online courses.

The development of e-learning during the five years 1999-2003 has been sufficiently important to create a department devoted solely to these activities. However, the four-year contract (2004-2007) and the latest ministerial e-learning policy have provoked UNS to change its strategy especially in organizational aspects. We look at these changes using the BSC.

From 2004, the change in the state's e-learning policy led UNS to join the Numerical Universities Region (UNR) and the Numerical Thematic Universities (UNT). The purpose of the former is to share hardware and software investments at a regional level; the latter was aimed at the sharing of already existing numerical resources in academic disciplines. Consequently, the department dedicated to ICT in learning was reorganized to initiate, support and manage any ICT integration projects and learning activities. However, this structural change has not resulted in a change in teaching practices or an evolution of learning processes (Garrett and Jokiverta 2004). Most changes have been limited to e-learning tools and to the characteristics of web courses.

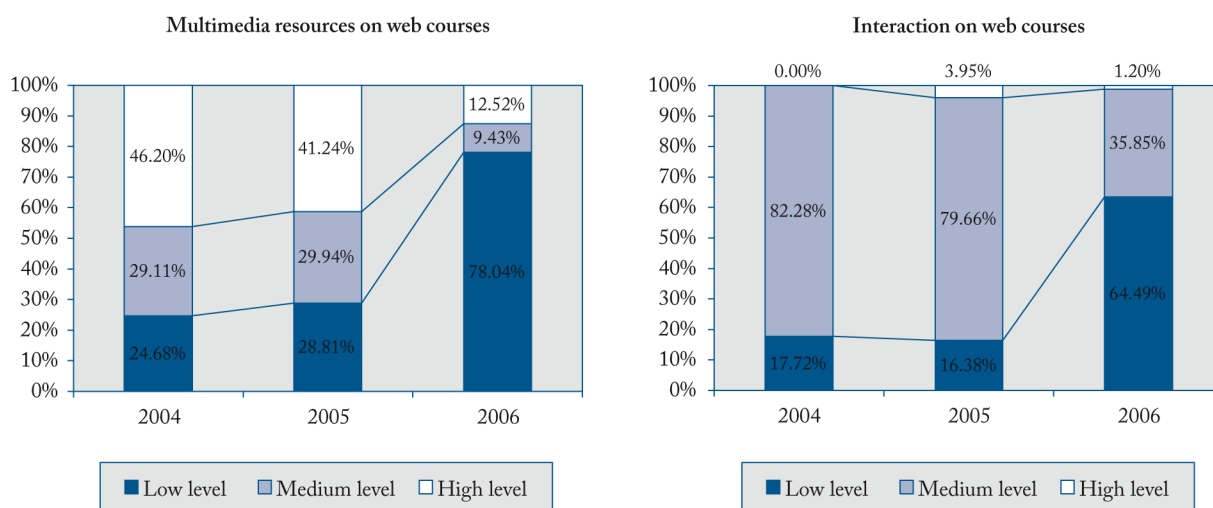


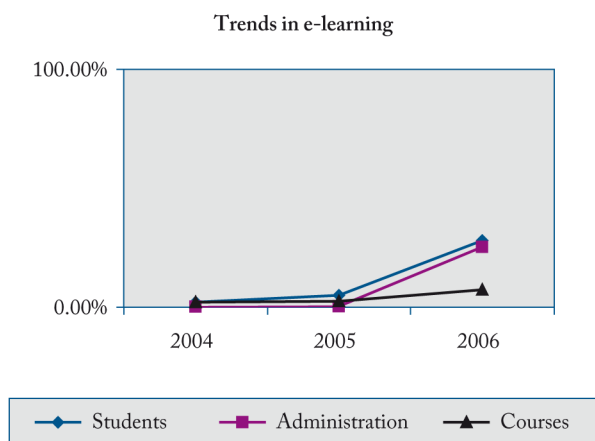
FIGURE 2: UNS indicators and data on internal business process (BSC)

5. The media input is not shown as the figure is the same as for interaction.

For the UNS, medium and high levels of interaction and mixed media use prevailed until 2005. From then, the trend for BSC indicators was to decrease. For example, the percentage of courses proposed with high levels of media interaction dropped from 46.20 in 2004 to 12.67 in 2006. A similar trend can be observed for the costs related to interconnection services, to learning content (such as courses and learning material, simulation, virtual reality) and learning interaction (such as forum, email, collaborative tools, tutorial systems, etc.). Most investments were before 2004; consequently, the investment trend is also fairly stable after this time. Moreover, the comparison between expenditures and income underlines the weakness of the UNS resources dedicated to e-learning; the increase in the financial effort is no more than 0.22 per cent over the 2004-2006 period.

Thus, 2005 can be considered a turning point in the trajectory followed by UNS. The interaction level decreases, and the evolution of courses with high levels of interaction and media use remains stable. However, in the following two years, UNS began to direct efforts towards web enhanced courses and ICT related staff training (see below figure 3).

Since 2005, the number of web-enhanced learning diplomas has risen sharply. This investment orientation directly benefits students. In 2004, only 2.06 percent of students were participating in e-learning; in 2006 this rose to 28.05 percent. At the same time, the percentage of professors involved increased from 12.42 in 2004 to 41.28 in 2006. Significant efforts have also been undertaken in the training of staff. For example, the number of professors who have undertaken training programmes increased from 5.15 percent in 2004 to 21.78 percent in 2006.



Number of students	2004	2005	2006
Online diplomas	59	95	103
Blended learning diplomas	0	18	10
WEL diplomas	489	1,179	6,884

I.3. E-learning tools training			
	2004	2005	2006
Percentage of students	0.73%	1.67%	4.01%
Hours per student	2	2	2
Percentage of lecturers	5.15%	4.76%	21.78%
Hours per lecturer	2	2.03	2.65
Percentage of administrative staff	0.28%	0.39%	25.48%
Hours per administrative staff	5	5	4

FIGURE 3: UNS indicators and data on customer and internal business process (BSC)

The UNS trajectory is currently much more oriented towards web-enhanced learning and ICT based administration. ICT use in web-enhanced learning seems to be less intensive than in online diplomas. In other words, its use tends to replace already existing tools and to facilitate teaching practices, without changing learning processes.

Moreover, in spite of efforts made in using ICT for learning, the proportion of e-learning courses that are available is still quite small: UNS has only 7 percent. However, it shows good progression because a large part of courses involve low levels of media and low levels of interaction.

Regarding the learning and growth dimension, UNS became much more dynamic in 2006, especially in terms

of conferences and projects. The e-learning ministerial policies (UNR, UNT) started in 2004 could explain the increase in these indicators.

Finally, it should be noted that, like the Polish university, UNS is devoting e-learning investment to web-enhanced courses. This investment orientation has the advantage of needing only modest financial and pedagogical commitment while benefiting a large number of students. Although the BSC indicators sometimes differ quite widely for these two universities, their evolution has been similar with regard to the characteristics of web courses (levels of interaction and mixed media). In both cases, we can see a change in their e-learning trajectories during 2005.

3.2. Most experienced institutions in terms of e-learning

3.2.1. Nancy 2: Videoscope

In 2007, Ducreau and Lauch stated that the University of Nancy 2 (UN2), which is among the most innovative French HEIs investing in e-learning, has 20 years' experience in open and distance learning activities. Only the most significant events are described.

The implementation and use of ICT began in the late 1990s with the launch by the Ministry of National Education and Research of three calls for successive projects in 2000, 2001 and 2002 for the creation of French Virtual Campuses. Among the first innovative initiatives launched by UN2 was the operating system *News busters*, which started in the mid 1990s, in response to a request from the humanities faculty, and is still in force. But it was not until the Centre for University Distance Learning (CTU), which became ERUDI in 2007, was created, that ICT

was completely integrated into university policy. Through the Centre Videoscope, created in 1977, UN2 offers engineering and communication technology training, and intervenes as executive producer, partner or subcontractor in many academic institutions. The Ministry of Higher Education awarded Videoscope responsibility for project management and production of COMPETICE, whose goal is the design and implementation of a piloting tool for competencies in ICT. Videoscope is also a privileged partner in broadcasting led by the Ministry, including *Amphis of 5*, *Canal-U* and French universities' web TV.

At the beginning of the period, in 2004, more than 3,000 students were enrolled in e-learning degree courses (online or web-enhanced diplomas). In 2005, an important step in the process of ICT integration was made with the implementation of a digital work space (ENT) to support distant access and resource sharing in a personalized environment. Expenditures on e-learning doubled in 2005 and reached 1% of the university budget in 2006. This evolution is mostly due to a major increase in the general expenses for e-learning (a 70% increase), in which staff costs play an important role.

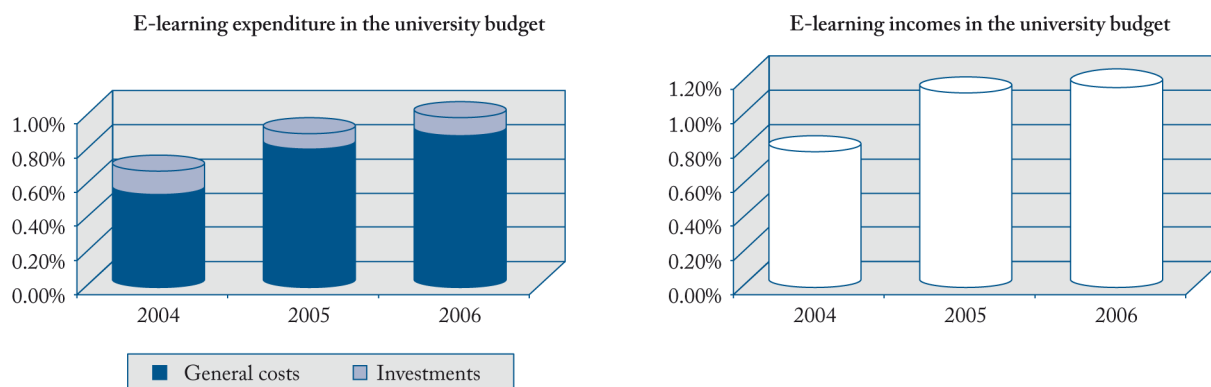


FIGURE 4: Nancy 2 indicators on financial dimension (BSC)

Between 2004 and 2006, expenditure and income grew in a comparable way, and e-learning incomes represented 1.2 percent of the university budget in 2006. A discrepancy between the increases in general expenditures and investments arose because of the duplication, in 2005, of the human resources involved in open and distance learning. This investment in human capital represented 19.3 percent of total e-learning expenditure in 2004, falling to 7 percent in 2006. Moreover, 2004 is characterized by the development of new platforms requiring initial financing. This investment in the technical framework was directed particularly towards increasing the capacity of the servers that were

required to support and manage the fast growth in traffic, and improving the quantity and quality of materials used in teaching (Rumble, 2001).

Training sessions for people (students, administrative and teaching staff) involved in e-learning increased. It is interesting to note that, despite a decrease in the total number of university students since 2004, the number of those that have been or are enrolled in ICT training increased, reaching 30 percent in 2006.

UN2 funded a great part of its e-learning activities through its involvement in a diversity of institutional projects (Ministry of Higher Education and Research, re-

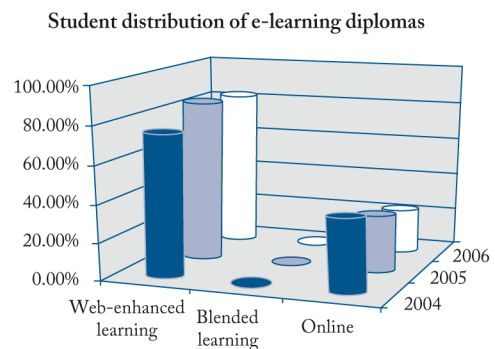
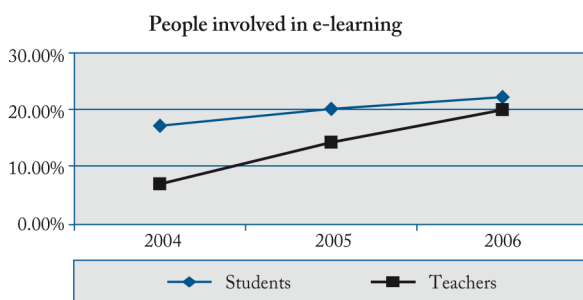
gional and European institutions). But the university had no strategy of its own to fund e-learning activities until 2005. The strategic e-learning orientation of UN2 only emerged after the four year contract (2005-2008), at the financial and managerial levels. As at other universities, the proportion of online diplomas is falling, so incomes from e-learning, which represent about 25 percent of university funding, is not growing. The number of students following e-learning diplomas increased between 2004 and 2006, but

most, around 80 per cent, were following web-enhanced diplomas. As already noted, this investment orientation has the advantage of necessitating a moderate commitment while affecting numerous students. The percentage of students and teachers involved in e-learning is increasing. This upward trend in the numbers of people involved in e-learning explains the increase in the indicators for technical capacity and training.

Customers / Students

C.1. People involved in university e-learning			
%	2004	2005	2006
Students	17.26%	25.25%	22.33%
Teachers	6.95%	14.33%	20.08%
Numbers of course/teacher	0.85%	1.19%	1.62%
Courses	12.25%	16.33%	20.99%

C.1. People involved in university e-learning			
%	2004	2005	2006
Online diplomas	24.66%	20.69%	19.32%
Blended learning diplomas	0.00%	0.00%	0.00%
Web-enhanced learning diplomas	75.34%	79.31%	80.68%
Number			
Online diplomas	805	754	776
Blended learning diplomas	0	0	0
Web-enhanced learning diplomas	2,460	2,890	3,240



C.3. Number of additional services provided online			
	2004	2005	2006
	13	13	13

FIGURE 5: Nancy 2 indicators on customers / students dimension (BSC)

Like the other three universities, UN2 has undertaken important efforts on the training of staff, teachers and administrators. However, unlike the other three universities, the proportion of UN2's courses that offer high levels of mixed-media (virtual laboratories, collaboration activities, etc.) is not decreasing. Although the figures fluctuated between 2004/2005, UN2 has generally consistently continued to develop web courses with high levels of media content. Also the level of human interaction is increasing, with a positive trend in the number of courses with

medium and high levels of interaction. The evolution of courses with low levels of human interaction has decreased dramatically (see figure 6). This can be explained by the initiatives for regular training of teachers, by experience feedback from the existing systems and by the desire to improve the quality of pedagogic support and content. The extended experience in e-learning activities explains the relative weakness of the indicators on projects; the learning and growth dimension is oriented towards conferences as most projects were established prior to 2004.

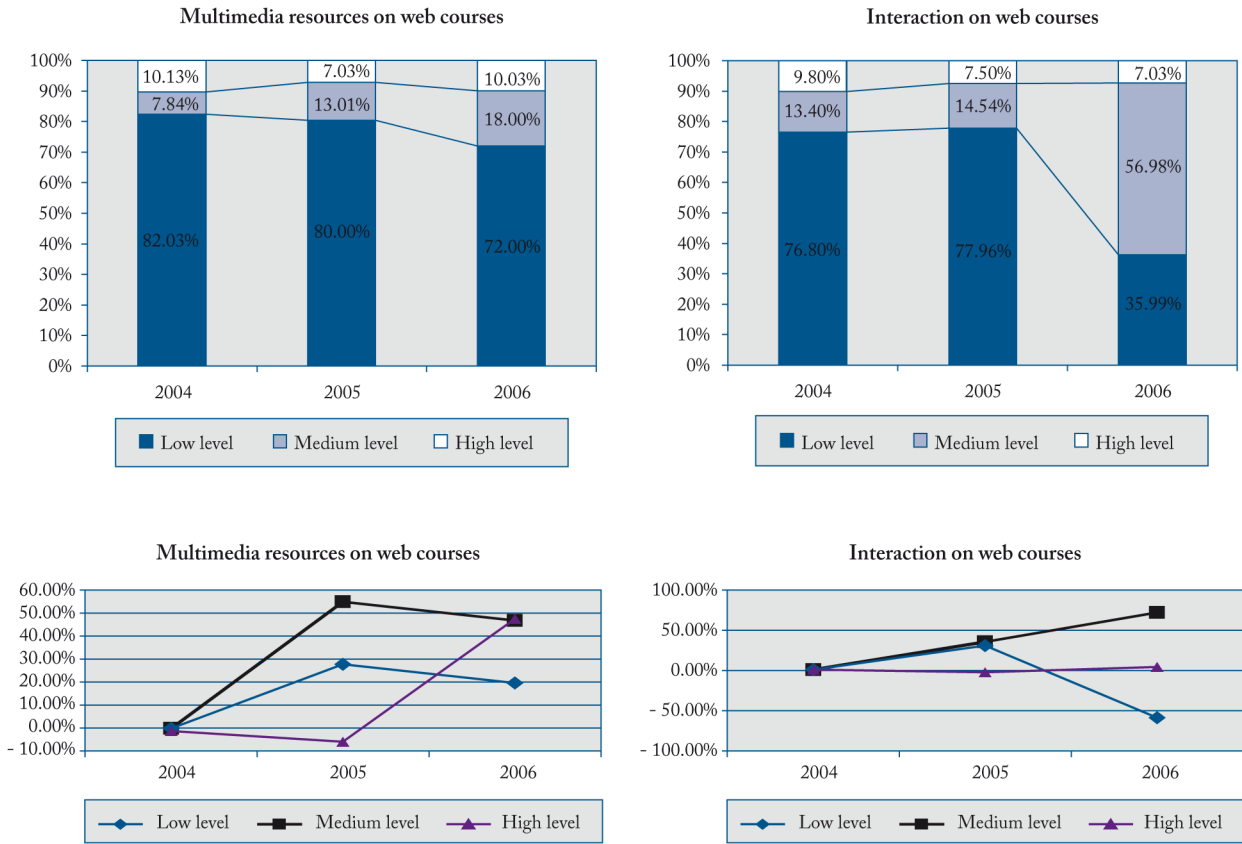


FIGURE 6: Nancy 2 indicators on internal business process dimension (BSC)

3.2.2. Politecnico di Milan: METID Centre

According to Sancassani and Tomasini (2007), the Politecnico di Milan was the first Italian HEI to invest in e-learning. In 1995 the Politecnico decided to concentrate on e-learning activities with dedicated staff in a specific centre: the METID Centre. METID is devoted to the *development and adoption of innovative tools and methodologies in university teaching*. In particular it promotes support for teachers and didactical innovation via the use of computers, multimedia and telecommunications technologies. METID developed and maintains videoconferencing to enable students to follow lectures from all Politecnico Campuses without the need to travel. For instance, the “Laurea On Line” is a degree in Computer Engineering and the first fully online Italian university degree. The project started in 2000, and the first students completed their degree studies in July 2003. Great attention was paid to guaranteeing a high quality offering: the same teachers and tutors were involved as in face to face courses, and the course programmes and examinations were of the same high quality. In 2007 more than 450

students were enrolled in this online degree course. In 2005, METID addressed multimedia and technological aspects in several projects targeting schools, enterprises, special contexts (prisons, people with disabilities, etc.). These projects were developed in partnership with agents external to the university: ministries, regional or local administrations, private companies, and other associations, such as syndicates, not-for-profit associations, etc. Currently the Politecnico is developing e-learning as a strategic support for three aspects: increasing the quality of the traditional didactic activities; developing new extracurricular paths (particularly related to lifelong learning); and the development of international projects where e-learning seems to provide a powerful means to enhance the internationalization of the university.

Data show that the proportion of e-learning in the university budget was 0.23 percent in 2004, 0.21 percent in 2005, and 0.26 percent in 2006. This trend is linked to the fact that a consistent part of the investment in e-learning is connected to projects funded by external institutions. But indeed, this financing depends partially on the political or economic context.

Financial

F.1. E-learning expenditure in university budget			
	2004	2005	2006
Percentage of university budget	0.23%	0.21%	0.26%
General costs	0.19%	0.20%	0.23%
Investments	0.04%	0.02%	0.03%

F.2. E-learning incomes in university budget			
	2004	2005	2006
	0.48%	0.51%	0.54%

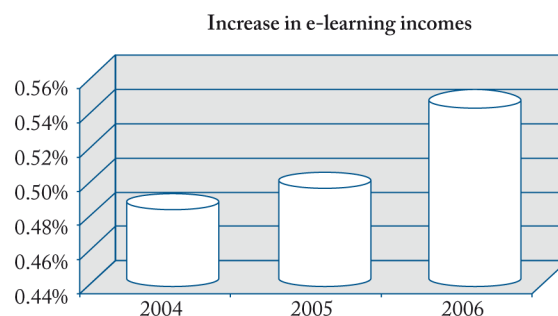
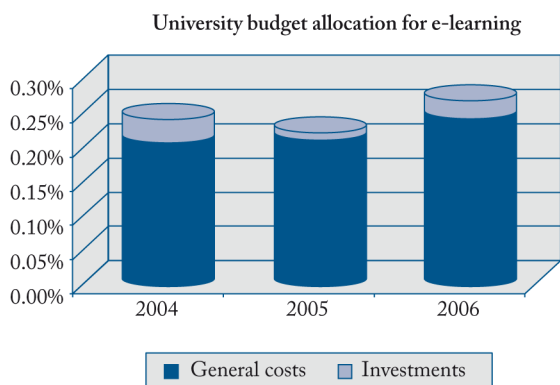


FIGURE 7: Politecnico di Milano indicators on financial dimension (BSC)

The expenditures are mainly general costs, which include staff costs. The conception and realization of an e-learning project requires a high level of human resources engagement in multimedia, software and methodology development and, moreover, detailed management and monitoring throughout the didactic path. The increase in expenses is less evident (0.01%, 0.19% and 0.20% for the 2004-2006 period) because both general costs and annual costs of e-learning showed similar increases in 2006. In 2004, the percentage of investments was 0.04 per cent of e-learning expenditures in the university budget. There was a slowdown in 2005 (investments dropped to 0.02%), because purchases in the previous year covered part of the project requirements for 2005, and then rose in the following year to 0.03%. Analysing income over the three year period 2004, 2005 and 2006, we can see a consistent increase in the amount of income for the university in e-learning: 0.48 percent, 0.51 percent and 0.54 per cent respectively. The BSC graph shows this trend very clearly.

E-learning development is funded by a variety of sources: in part directly by the university but to a greater extent externally, by public institutions or private organizations. It is important to highlight this because annual e-learning activities are strictly linked to the origin and the amount of financing. In 2006, for example, the change in the Italian government, linked to a reorganization within

public institutions, caused a temporary slowdown in the economic flux of new projects.

As can be seen in the table below, the highest figures for courses correspond to those with low levels of media and interaction: around 89% in 2004 and a slight fall to 87.11% in 2005, even though absolute numbers increased between 2004 and 2006 (low level courses represent almost the totality of web courses in each year, so the proportion remains similar). It is also interesting to point out that the number of students involved in e-learning at any level constantly grew since 2004, eventually encompassing almost all of the Politecnico's students: 69.85% in 2004 and 99.61% in 2006. However, the vast proportion of web students follow web-enhanced diplomas. Blended and e-learning diplomas represent a small part of the university's enrolment, but they are very relevant from a strategic point of view in enhancing the exploration and development of new technologies and methodologies. Learners following online diploma courses decreased from 527 in 2004 to 343 in 2006. This trend is particularly due to new and similar offerings from other universities in Italy, which are often easier and cheaper than the very selective courses offered by the Politecnico. The rate of evolution of courses with medium and high levels of ICT integration remains low, but they are very important in providing contexts for the testing and development of innovative solutions for future

integration in the standard services offered by the university. The number of courses with high levels of media and human interaction has risen in recent years, although they represent a small proportion of the total number of web

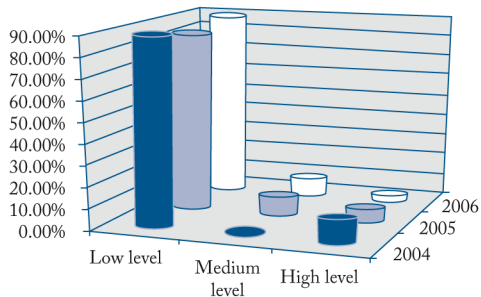
courses. Their rate decreased from 10.45 percent in 2004 to 3.64 percent in 2006 because of the parallel growth of low level media and low level interaction courses provided by the university.

Internal business process

I.1.a. Multimedia resources on web courses			
	2004	2005	2006
Low level	89.55%	87.11%	89.18%
Medium level	0.00%	7.45%	7.18%
High level	10.45%	5.43%	3.64%
Evolution rate			
Low level	ns	46.52%	34.54%
Medium level	ns	100.00%	30.43%
High level	ns	0.00%	0.00%

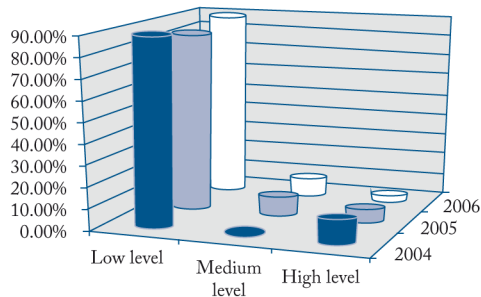
I.1.b. Interaction on web courses			
	2004	2005	2006
Low level	89.55%	87.11%	89.18%
Medium level	0.00%	7.45%	7.18%
High level	10.45%	5.43%	3.64%
Evolution rate			
Low level	ns	46.52%	34.54%
Medium level	ns	100.00%	30.43%
High level	ns	0.00%	0.00%

Multimedia resources on web courses

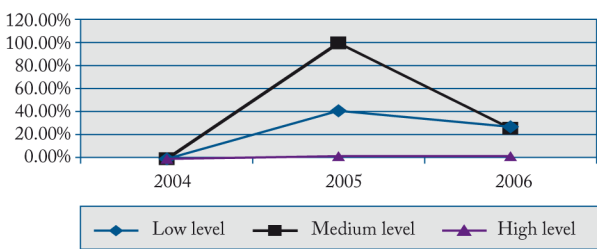


See evolution rates next page

Interaction on web courses



Evolution of multimedia resources on web courses



Interaction on web courses

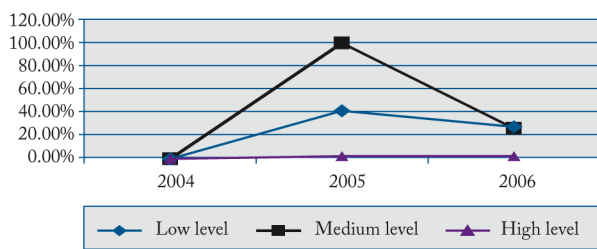


FIGURE 8: Politecnico di Milano indicators on internal business process dimension (BSC)

Courses with medium levels of ICT integration have been offered as blended Masters and extracurricular courses. Blended courses represent a very particular situation where the investments in media services and human interaction do not reach very high levels because resources are shared with the face to face courses.

Communication aspects are of great importance for all HEIs. In fact, as the data show, the e-learning activities of the Politecnico are well advertised and encourage the creation and fostering of partnerships with national and international institutions and companies.

Learning and growth

Events brought by e-learning activities			
	2004	2005	2006
Conferences	68.00%	45.00%	38.00%
Projects	13.00%	19.00%	25.00%
New partnerships	20.00%	46.00%	16.00%

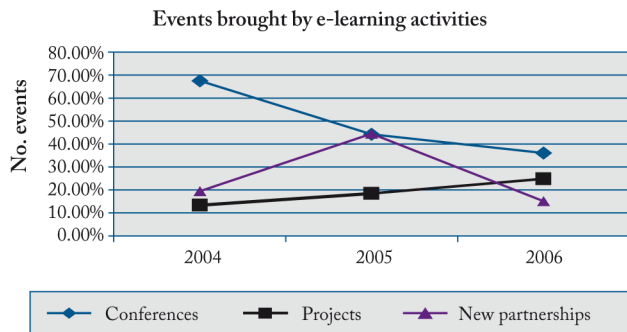


FIGURE 9: Politecnico di Milano indicators on learning and growth dimension (BSC)

As the data show, 2005 recorded the highest number of events; this depends, in part, on the number of mentions in the printed media. In 2006 the data show an increase in the number of new projects, which reached 25. In 2006 there was a rise in Politecnico staff participation in national and international conferences, both as participants and presenters.

4. Conclusion and discussion

Among the participants in the workgroup, some have responsibilities for the management of e-learning activities in their institutions and they had a first hand opportunity to test the BSC approach during the last months of 2007. Initial feedback is available. The period of experimentation is too short to draw any firm conclusions on the use of BSC, but it is interesting to make a preliminary analysis of its impact on the management of HEIs, one of our original goals. Susanna Sancassani, managing director of the Centre METID, Politecnico di Milano, experimented with it for a board meeting and emphasized the following points:

“E-learning is a complex field which needs a ‘multifaceted’ approach for a good strategic comprehension: we discovered a lot about ourselves! We are able now to show to stakeholders (METID Scientific Committee, university decision makers but also teachers and students) how, really, e-learning impacts the life of the university. At least, it is important to personalize the model to a specific context by introducing or modifying single indicators” (Sancassani and Tomasini, 2007).

An extended version of the METID feedback will reveal success factors or initial hypotheses, by analysing the

four case studies. During our two years of work, several things became clear. First, the total cost of e-learning activities in the university budget. For the most experienced partner with more than 20 years of activity, the proportion was 1 percent and for the least experienced it was less than 0.2 percent. Many people, including the members of WP3, had perceived e-learning to be “very costly”. In terms of the changes provided by ICT to learning activities, the financial implications for the universities studied were quite small. And deeper analysis of the financial data reveals that within a few years incomes exceed expenditure. Indeed, e-learning becomes a profitable activity when the universities involved develop external partnerships.

Other evidence comes from the analysis of the degrees offered in terms of e-learning services. All the partners first implemented or reoriented their strategic goals to WEL. WEL has become a standard offering for students at one institution. Before the structural changes were announced, it seemed necessary to increase ICT-based equipment and examine its use. However, the emphasis on WEL shows that universities had some difficulty in developing fully online degree courses with high levels of interaction and media involvement. As we have shown, WEL consists of the transformation of traditional lectures into a multimedia format. But the provision of full online degree courses, of high quality, requires more than mere substitution or transfer. It requires a change in didactics and an evolution in teaching practices and learning processes (Garrett and Jokivirta, 2004). Blended learning is marginal in our sample of universities, but there are certain actors that see it as another path towards cultural change.

Although this study provides comparative data for three European countries and four case studies, it has some limitations. The BSC was clearly designed for HEI deci-

sion makers and to provide answers for management and organization in university e-learning activities. It might be considered rather bold to use this data set for comparison and to describe e-learning development in HEIs. In order to achieve a more coherent approach and the possibility of extending the comparison, it will be necessary to develop new tools. These tools should allow the conceptualization of the trajectories of universities with the dual goal of identifying critical strengths in the progression of e-learning activities in higher education systems, and designing strategies to inform and help institutions in the management of e-learning activities. A preliminary report was presented in Paris in December 2007, but has to be tested and developed. It needs to fully address questions such as: Are Virtual Campuses a good way to manage e-learning activities? And, if so, what kinds of activities? (Stanfield, 2007).

A return to Kaplan and Norton's (1997) proposition would be useful. The BSC application should not be limited to a simple performance measurement of open and distance learning activities. As these authors affirm, "Balanced Scorecard is management not measurement". It is rooted in a global concept of organization focused on strategic aspects and therefore represents an ideal instrument to move a complex organization, such as a university, forward in the achievement of a collective vision and objective. This approach should be generalized to all areas of HEI in order to be coherent with higher education, research, continuing education and e-learning, but this is a separate goal.

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[^{www1}] <http://www.elene-ee.net>

[^{www2}] <http://www.canege.org/accueil.htm>

[^{www3}] <http://www.aunege.org>