

## **The “RETE PUGLIA” Centre: A Laboratory for distance learning and e-learning in the Apulia Region (Italy)**

S. IMPEDOVO ieee, acm member

Dib-Bari University-Via Orabona 4- I 70126 Bari

Centro Interfacoltà “Rete Puglia” – Università degli Studi di Bari - Via G. Petroni, 15/F.1 – 70124  
Bari - ITALY

<http://retepuglia.uniba.it/Impedovo/index.htm>

*Abstract:* - In this paper the description of the results of three main projects : Rete Puglia, SCORE and PROTEO projects are reported. More specifically the activities promoted and developed both for distance learning and e-learning are presented. The infrastructures that have been already realized are described and the results of the experimental use of the systems and platforms are shown, also some tests of the incoming activities are presented.

*Key-Words:* - ICT, Knowledge based society, Internet , Distance Learning Laboratories, E-learning, Course Maker, Learning Management System,. Broadband networks, Metropolitan area network, Optical Fibres.

### **Introduction**

In this paper the results are reported of the three main projects that have been developed with the goal of promoting distance learning and e-learning in the Apulia Region, that is the south-east region of Italy. The reason for the Italian Government's decision to support the projects can be found in the great number of students enrolled in Bari University. In order to respond to the learning demand in the past years, several solutions have been tried, obviously the first was the construction of some new lecture rooms and also new universities were created, specifically in those sub regions where the students attending Bari University were more concentrated than in the others. In fact some years ago, Bari University, before its splitting into three Universities: the Bari University, the Bari Polytechnic, and Foggia University, had more than seventy five thousand students. Now it is also generating another two new Universities, one in Taranto and another in Brindisi.

Notwithstanding the efforts made in the past several problems still continue to exist. This is also because the growing modern society is querying a new type of education. It is based on the need for continuous learning. In fact, we are rapidly going towards a knowledge based society, and this implies that both for education and work the new paradigm is learning to do well and soon. Obviously all this depends on the need to remain competitive on the markets and to improve the quality of life.

Internet can solve these problems; in fact everybody can connect anytime and anywhere with any type of computer or personal digital assistants (pdas) to web sites that have been developed for teaching purposes.

This is an important aspect of the transition toward the Information Communication Society (ICT).

Some initial experiments on distance learning have been developed in recent years (1999-2004) in the project “Rete Puglia” supported by the Italian Ministry (MIUR) and developed by the Italian National Consortium for Informatics (CINI). Successively another two large national operative projects (PON)-projects: (SCORE) and (PROTEO), also supported by the MIUR with a large contribution from the EUROPEAN COMMUNITY, are trying to introduce into Bari University a new type of infrastructure to solve the problem and promote the development of a knowledge based society.

In section 2 a short description of the contents and results obtained by the projects : “Rete Puglia” and “SCORE” are reported . They show the need for the transition from frontal and remote teaching toward the e-learning. The main activities and results of the PROTEO project are reported in section 3. The results of one experiment in generating and using a course of Operating Systems in the Bari University is presented, but several others are shown in the next paper of this special issue. The various Faculties involved in the project are indicated in section 4. Some conclusions are then reported and generally the

greatest difficulties in going toward a knowledge based society are discussed.

## 2 The “Rete Puglia” and SCORE Projects

The “Rete Puglia” project was financed with the aim of developing distance learning both for university courses and for training the highest level of employees in local public administration, allowing them to obtain European Computer Driving Licenses (ECDL) and so enabling them to introduce ICT into their offices. By using several multimedia tools, among them: Macromedia Director 7 Shockwave Internet Studio WIN; Macromedia Authorware; Macromedia Dreamweaver MX; Macromedia Flash MX; Adobe Photoshop 5.5 Win; Helix Producer Plus; Photovista virtual tour version 1.0; Adobe Premiere 5.1- Video Editor Win; Frontpage 2000; Microsoft Office Professional and Toolbook II Instructor 8, Add-on, several CDs for teaching courses were produced, and some of them are here reported: Operating Systems, Introduction to Hardware, Object Oriented Technologies and Multi Tier Web Application, Linear System Theory and Digital Transformation, Introduction to the Wavelet functions, Image Retrieval and Text Analysis, Neural Networks and Fuzzy Systems, Cognitive Models and Cognitive Systems, Intelligent Systems for Office Automation, Data Acquisition Devices, Object Oriented Designing, The Khoros Software Framework, Bankcheck processing: Courtesy Amount Recognition, Computer Network, Document Recognition and OCR, Informing via Web, Multimedial design, Innovative Communication, e-government, English in the Bari Art Gallery, Multimedia for cultural assessments, The Old City of Bari, Conversano: Culture and art, Putignano City, The Bari Provincial Art Gallery, Business Process Reengineering.

Each CD gave the students who were unable to follow the lectures held in a lecture room either in presence or at distance, to study at home.

The lecture rooms used for distance learning were equipped with AVC 400 ETHRA and VSX 8000 POLYCOM instruments. Some of these lecture rooms were used in the Faculty of Science mm.ff.nn., but many others were also used for teaching courses in the Faculties of Medicine and Law [1].

Some courses reported above, together with others acquired on the market, were used not only for teaching university students, but also to train

the employees of the four public administrations involved in the projects. Those are respectively those of Bari, Putignano, Conversano Cities, and also the employees of the Bari Provincial Art Gallery. Table 1 reports the number of people from each public administration involved and who took the European Computer Driving Licence (ECDL).

Local Government Units	Number of employers
Bari Provincial Art Gallery	5
Bari City	8
Conversano City	8
Putignano City	11

**Table 1 Public employees involved in the remote learning**

For each course two types of evaluation were made, the first to evaluate the products, by adopting the standard ISO/IEC 9126 and the second to evaluate the teaching process by using the standard UNI EN ISO 9000:2000 (Vision 2000) [2].

For each local administration a web site was also created in order to promote the spreading of the knowledge of its artistic and cultural assets. The web sites realized are reported in the following Table 2.

Web site	URL:
Bari Art Gallery	<a href="http://www.retepuglia.uniba.it/Pinacoteca/">http://www.retepuglia.uniba.it/Pinacoteca/</a>
Bari City	<a href="http://www.retepuglia.uniba.it/Bari/">http://www.retepuglia.uniba.it/Bari/</a>
Conversano City	<a href="http://www.retepuglia.uniba.it/ComuneConversano/">http://www.retepuglia.uniba.it/ComuneConversano/</a>
Putignano City	<a href="http://www.retepuglia.uniba.it/Putignano/">http://www.retepuglia.uniba.it/Putignano/</a>

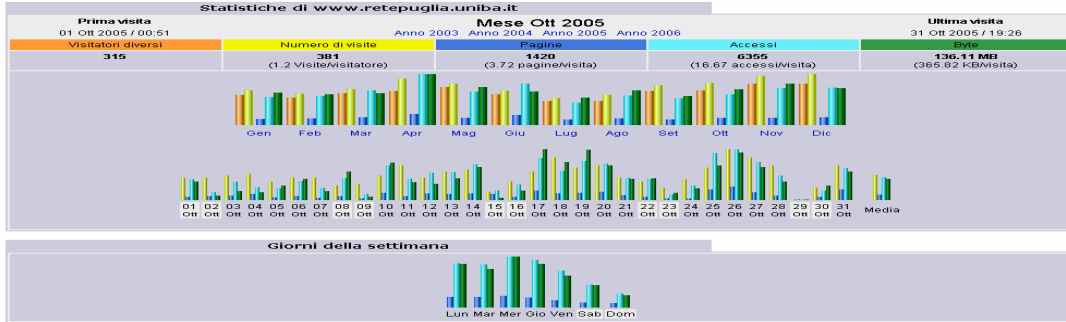
**Table 2 web sites realized for public administrations**

To support the “Rete Puglia” Project activities a cluster consisting of four PCs was used as a web server. To give fault tolerance the heartbeat was used. Linux Virtual Server (LVS) software was used for its high availability. The Apache software was installed on each physical machine.

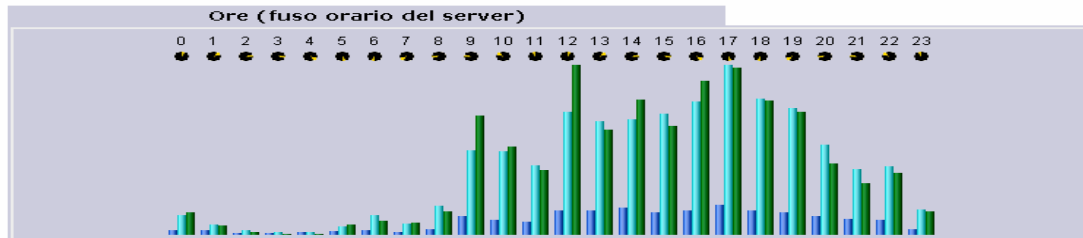
The most relevant monuments, churches, squares, ancient buildings, and other attractive places were included in the virtual tours. By using

3D images, that can be also zoomed, interesting and amusing visits are possible. Furthermore, some streaming documents related to relevant city events and some streaming reports showing some popular traditional events are also available. The ISeeMedia Zoom Image Server and Real -

Helix Server were installed for the purpose. The software AWStats was also installed to analyse web-server log-pages and to create statistics of web-site surfing. Several statistics of the web site access for each site realized were analyzed and some of them are reported in Tables 3, 4, 5 and 6.



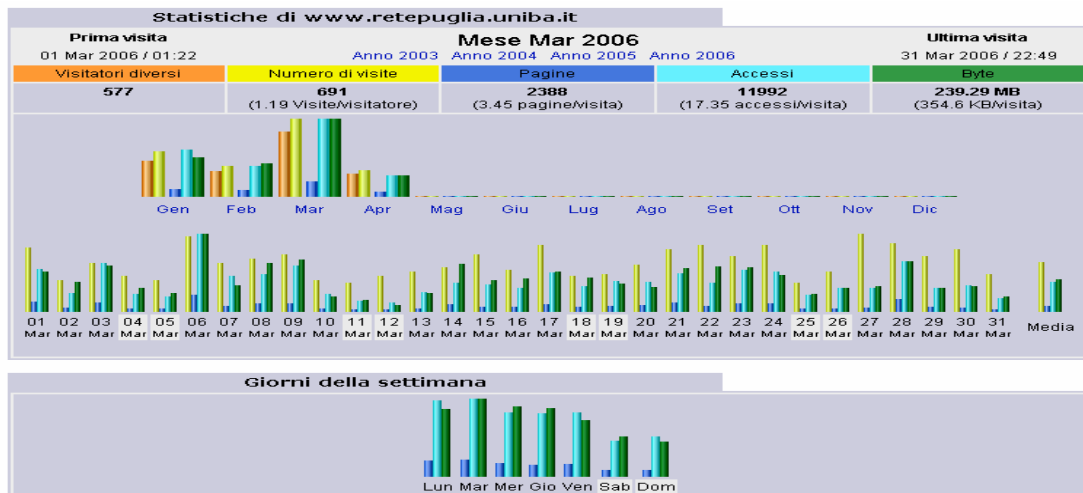
**Table 3 Access to the Conversano web site**



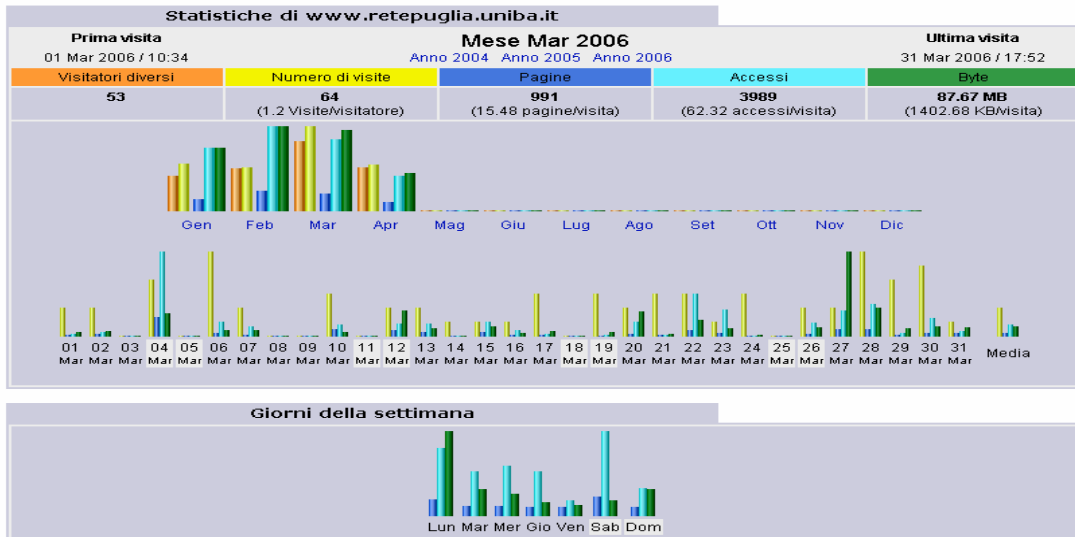
**Domini o paesi dei visitatori**

Domini o paesi	Codice	Pagine	Accessi	Byte
Italy	it	1645	9065	179.25 MB
Sconosciuto	ip	233	969	22.01 MB
Commercial	com	182	332	3.18 MB
Network	net	161	971	21.36 MB
Czech Republic	cz	42	42	249.95 KB
Spain	es	34	138	1.48 MB
France	fr	29	155	5.55 MB
Germany	de	26	113	2.00 MB
Belgium	be	8	44	1.42 MB
Thailand	th	6	33	403.73 KB
United Kingdom	uk	4	24	537.84 KB
Switzerland	ch	3	26	376.93 KB

**Table 4 Access to the Conversano web site**



**Table 5 Access to the Conversano web site**



**Table 6 Access to the Bari Provincial Art Gallery**

Tables 3 and 5 show the increase in the access frequency from October 2005 up to March 2006, which was also recorded for the other web sites.

The project involved several professors and more than twenty young people both at graduate and undergraduate level. More than one half are now employed in public and private companies and the other are continuing their training in other projects and are continuing to study.

There were two main benefits for the university: the first lies in the fact that the four universities of the Apulia Region that is: Bari, Lecce, Foggia and the Bari Polytechnic were connected with each other and therefore were able to conduct some cultural exchanges both for research and teaching in distance learning; the second was that the four local administrations: Bari, Putignano and Conversano cities and the Bari Province were able to train their employees in the use of ICT, that is now used for institutional purposes, connecting the public offices with national and European Union web sites.

The systems and devices developed in the “Rete Puglia” project were then completed with some new instrumentation. For this purpose a new project was realized: the SCORE (Software COopeRativE development in network) project, which provided new hardware and software for in presence and distance teaching. Specifically a multimedia classroom equipped with a desk and 21 PCs was realized (Fig.1). All the PCs are connected by means of the LanSchool software. A drum scanner (ICG 370), exhibiting an optic power resolution of 12000 dpi, equipped with an Apple system on which a Mac OS X operating system and a colour plotter (HP DesignJet 5500) supporting ps and pdf file formats and pantone colours have been also acquired.

Some Multimedia laboratories for image processing, image and stream capture, audio-video processing, 3D animations, and course production have been created.



**Fig.1 Multimedia didactic classroom**

A new multi-conference room (see Fig.2) was also realized by means of the SCORE project.



**Fig. 2 Multi-conference room**

### 3 The PROTEO project for e-learning in the University of Bari

The increasing access to the web sites of the cities involved in the "Rete Puglia" project has already been shown in Tables 3 and 5. The increase in the number of visits registered especially at the beginning of 2006 were the measure of how common people are trying to acquire knowledge. These results confirm the choice made and are based on the results of the "Rete Puglia" project that provided experiments towards teaching and learning processes that are free of time and place. The right answer to the public demand is e-learning, and some extended experiments are now in progress with the "PROTEO" project at the University of Bari [3,4]. The aim of the PROTEO project is to support the University of Bari in spreading e-learning, by means of the realization of a technological infrastructure capable of collecting and distributing the know-how of several knowledge domains [5], those of the most important Faculties of Bari University.

For this purpose, PROTEO is carried out by the Interfaculty Centre "Rete Puglia", that is the pilot Centre specifically created in the University of Bari to train students and use e-learning. In order to do this the functional model, shown in Fig. 3, has been adopted. Three different types of centres can be seen: Area Centres (AC) that are territorial poles, the Concentration Centres (CC) and the Specification or Specialization Centres (SC):

-The Area Centres (AC) also known as territorial centres, are centres in which knowledge is distributed, not only in presence by teachers, but also in distance learning mode. These centres are equipped with a multimedia desk [6,7];

-The Concentration Centres (CC) are centres in which knowledge is collected and organized;

-The Specification Centres (SC) are centres in which the technological and methodological aspects of e-learning (systems, products, operative methods, etc.) are investigated and divulged to the entire University.

In Fig.4 the technological infrastructure of the Coarse Wave Division Multiplexing (CWDM) is reported and finally in Fig.5 the structure of the switches for the poles is reported.

### 4 PROTEO Platform

A set of 18 AC have been equipped with an integrated multimedia desk allowing both in presence and distance learning for the Bari University. Both CC and SC have been installed in the "Rete Puglia Interfaculty Center" and consist of 5 servers (DELL Power Edge 6600) with Windows 2003 Server Enterprise edition as the Operating System, and NetLearning as the e-learning platform. The PROTEO platform is based on a Lectora Publisher as course maker, on Apache as the web server and on Oracle iLearning as learning content management system.

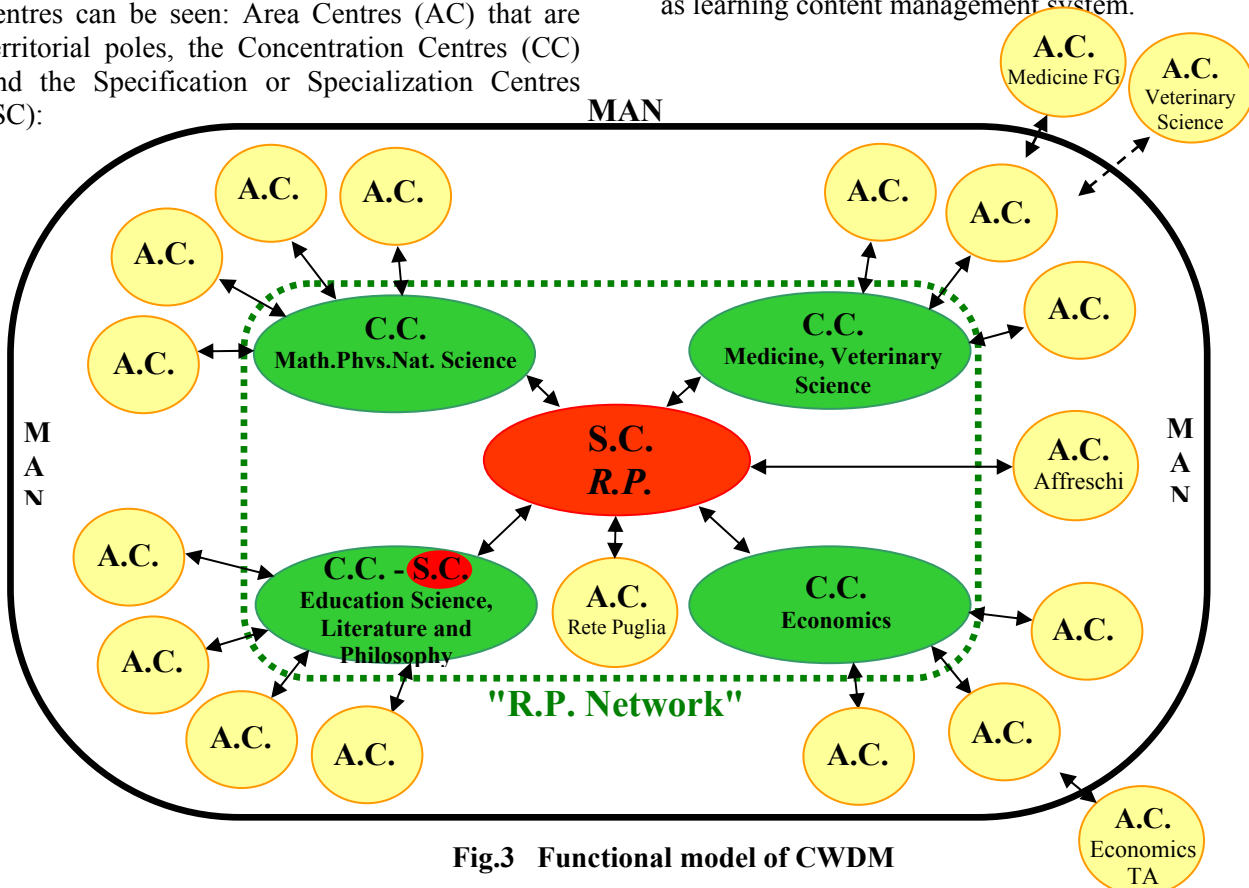
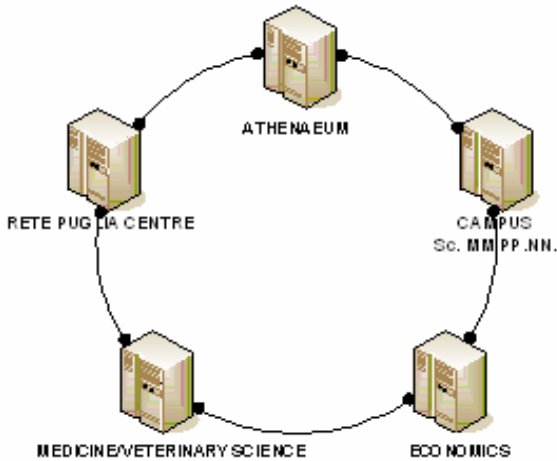


Fig.3 Functional model of CWDM





**Fig.4 Technological infrastructure of the CWDM**

A gigabit Metropolitan Area Network (MAN) connects the Centre with the teaching rooms. A lambda of a CWDM ring on a couple of optical fibres was dedicated to e-learning activities. The ring connects the main poles of the University of Bari (Athenaeum, mm.ff. and nn Science, Medicine, and Economics) with the Rete Puglia Centre.

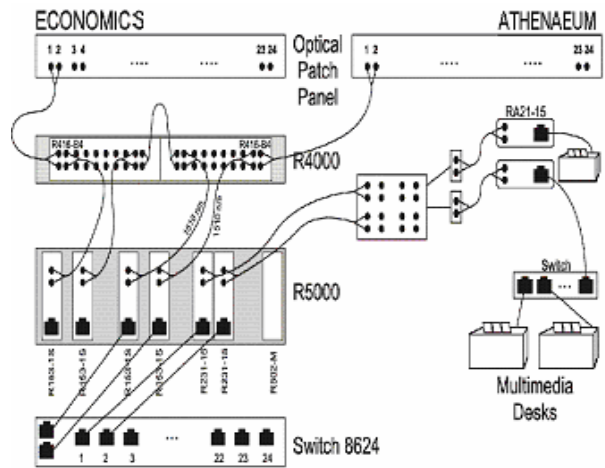
A portal gives all the students access to the platform to visit the various pages stored in it and to develop e-learning.

In this experiment, the first modules of some courses described in the next session have been imported in the platform and in the next session some results of learning experiments are also shown.

### 5 e-learning course preparation

In this section one example of e-learning [9,10] course preparation is reported, but also other courses, covering other cultural areas, are in preparation [11]. The one here reported is the Operating Systems Course, consisting of all the learning objects related to the presentation of the Processes and Threads, the Scheduling, the Memory and the File System. The learning objects (LO) have been produced by using the course maker "Lectora Publisher". All the LO are stored in the learning platform. More specifically the platform is stored in the Natural Science site, but other sites have been realized: one for Medicine, another for Veterinary Science, and another for Literature, Philosophy and Education Science.

The platform allows the tracing of all the activities developed both by teachers and students during the entire learning process. It also provides insight and suggestions to each student whether he



**Fig.5 Switch pole structure**

can go on in the learning process or if it is better to repeat the parts not sufficiently learned. This is done through a feedback system based on the answers of the students to specific questions specially prepared by the teachers.

Particular attention has been devoted to the most relevant issues concerning the evaluation of e-learning activities and some results are presented in the paper: "A Feedback-based Framework for Continuous Evaluation of e-learning Activities" presented in this issue, in which a well-defined framework for the evaluation of the e-learning product and process, is proposed and experimentally evaluated.

It is based on the well-known ISO 9000/Vision 2000 standards, that define quality as the degree to which a set of intrinsic characteristics satisfy the requisites. The framework adopts a participant-oriented strategy, in which the various stakeholders (students, teachers, tutors, heads of Faculty, secretaries, etc.) of the e-learning activity provide a feedback on the various aspects (systems, methodologies, protagonists, etc.) of the different stages of the e-learning activity. The framework is based on a continuous evaluation process and uses well-defined quality models to monitor different aspects an e-learning process [12].

The application of this framework to the evaluation of the e-learning processes at the University of Bari, demonstrates that it allows the fast identification of the weak points of the e-learning processes and products, and therefore it allows the rapid definition of the best solutions to reduce inefficiency in e-learning activities. In this sense, the proposed framework is very useful for creating a positive learning environment for the continuous improvement of quality in e-learning activities.

A part of the project that will be tested in the immediate future concerns the automatic control of the student carriers also enabling them to obtain a degree automatically. Obviously this must also involve the employees of bureaucratic controls such as tax payment, obeying exam regulations and so on. However, this will be one of the next aspects to be investigated.

## 6 Conclusions

In this paper a short presentation of the basic experiences developed to address the introduction of distance learning and e-learning and consequently the development of a knowledge-based society are presented, reporting the results of the three main projects: "Rete Puglia", SCORE and PROTEO projects. An example of a learning course is presented, but the preparation of many other courses is in progress and some of them are also presented in these proceedings. The testing of the entire platform is now also in progress.

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