

Progress in e-learning: toward the Knowledge Based Society

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Abstract: - In this paper the results of some experiences made by using the infrastructure already realized with the PROTEO project, financed by both the Italian Government and the EU, are reported. More specifically the e-learning activities promoted and developed at the University of Bari are described and some recent ideas for the development of future e-learning activities in the direction of the knowledge based society are introduced.

Key-Words: - ICT, Distance Learning, e-learning, Knowledge Based Society, Course Maker, Learning Management System, Broadband Networks, Metropolitan Area Network.

1 Introduction

In the “Rete Puglia” Interfaculty Centre of the University of Bari some experiments on distance learning have been developed in past years (1999-2004) by means of the “Rete Puglia” project, supported by the Italian Ministry for Education, University and Research (MIUR) and developed by the Italian National Consortium for Informatics (CINI) for the Apulia Region. Furthermore, other two large national projects, SCORE and PROTEO, both developed in the years 2004-2006 and supported by the MIUR too with a large contribution from the European Union (EU), have introduced into the University of Bari a new type of infrastructure to solve the problems of distance learning and e-learning and so to promote the development of ICT with the goal to give a contribution to the development of the knowledge based society (KBS) [1, 2, 3].

On the other hand the diffuse use of both personal phones, personal digital assistants, lap top and any type of telecommunication electronic device is allowing people to connect to the www anytime and anywhere [4].

As a matter of fact a new educational paradigm is required: it depends on the need for people to change rapidly their competence, for industries to remain competitive on the markets and for the global society to improve the quality of life. The new paradigm is to learn how to do well and soon.

The modification of the learning paradigm is important also to overlap the digital divide that separates north European countries from the south ones.

In our mind it is important that the ICT is included in the educational processes.

It must be also noted that, notwithstanding the efforts made in the recent past, several problems still remain unsolved and specifically those for a better use of the knowledge stored in the repositories.

A series of activities in producing and using learning objects has been developed. One of the most important aspects to be investigated in the immediate future will be, for each knowledge domain, the combination of the learning objects directly produced in the PROTEO project with the general information available in the www or with other LO to be produced. In this direction the goal could be the development of a model for using LO, based on Gagne’s Cumulative Learning Theory [5].

This would be another important step of the transition toward the Knowledge Based Society.

In this paper the problems related to the development of an infrastructure for e-learning activities, both for university students and common workers, are described.

In section 2 a short description of the platform, realized by means of the PROTEO Project, is reported. The results of the experiments in producing and using the learning objects for some courses held in the University of Bari are presented in section 3. Some general conclusions are at the end reported.

2 Platform for e-learning at the Bari University

With the Rete Puglia project a series of web sites each one respectively for Bari, Conversano, Putignano cities and for the Bari Provincial Art Gallery was realized.

The increasing of the access rate to these web sites, registered in the last years, and more specifically at the end of the 2005 and during the beginning of this year has given us a well defined idea of how common people is looking for knowledge acquisition [1].

As a matter of fact we are now addressing both our researches and our teaching activities towards learning processes that are free of time and place and also some new experience are in starting.

The new metropolitan infrastructure, realized with the PROTEO project [2], is then starting to be used and some extended experiments are now in progress at the University of Bari.

The aim of the PROTEO project is to support the University of Bari in spreading e-learning [3]. The new realized infrastructure is capable of collecting and distributing the know-how of several knowledge domains of the Faculties involved into the project. For this purpose, PROTEO is carried out by the "Rete Puglia" Centre [6], that is the pilot Centre specifically created in the University of Bari to train students to use e-learning. In order to do this the functional model, shown in Fig. 1, has been adopted.

Three different types of centres can be seen: the Area Centres (AC), the Concentration Centres (CC) and the Specification or Specialization Centres (SC):

- The Area Centres (AC), also called territorial centres, are centres in which knowledge is distributed, not only in presence by teachers, but also in distance learning mode [7, 8]. These centres are equipped with a multimedia desk;
- 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.

A dedicated e-learning infrastructure has been realized [9]. In Fig. 2 the Coarse Wave Division Multiplexing (CWDM) realizing the technological infrastructure is reported.

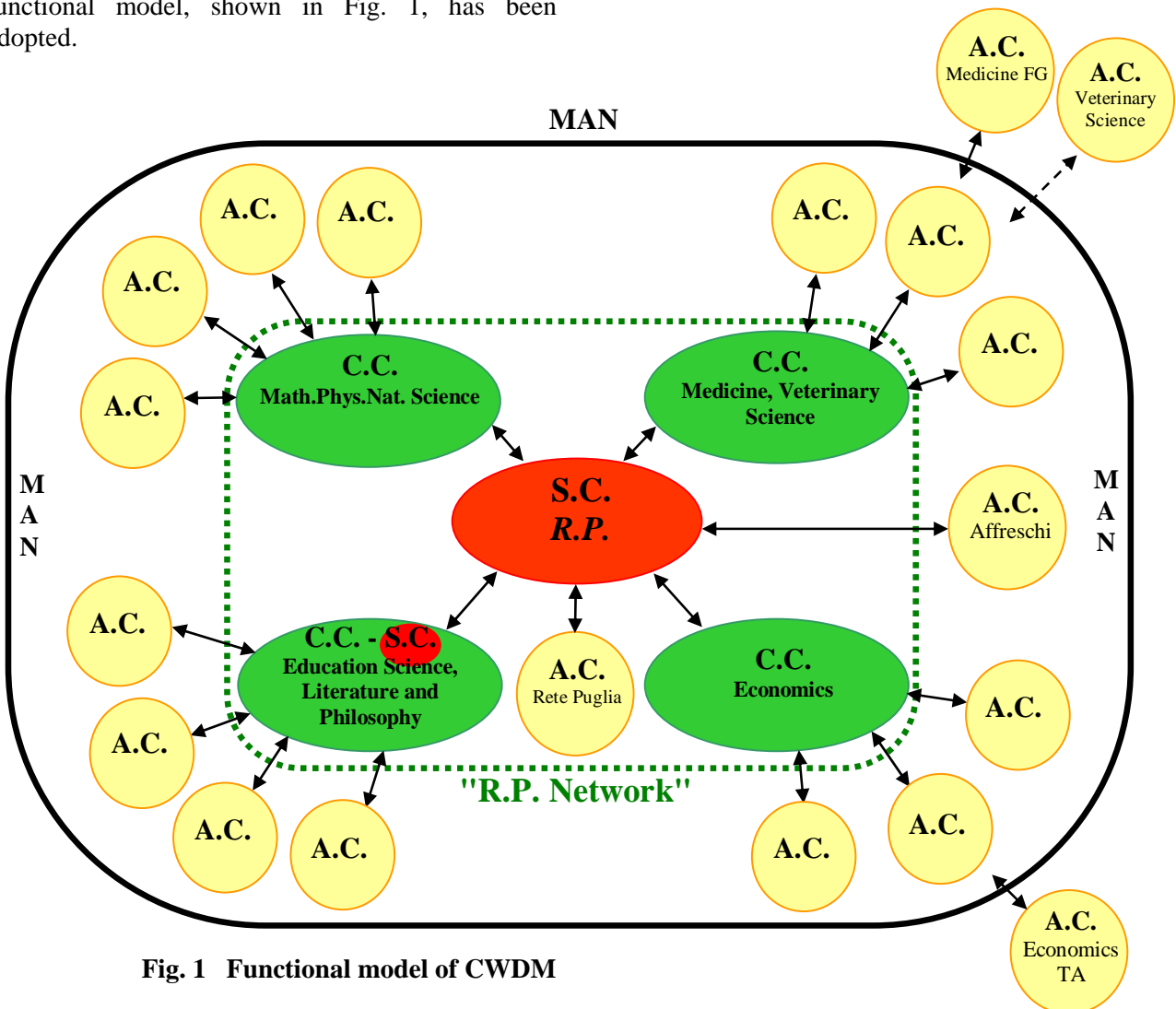


Fig. 1 Functional model of CWDM

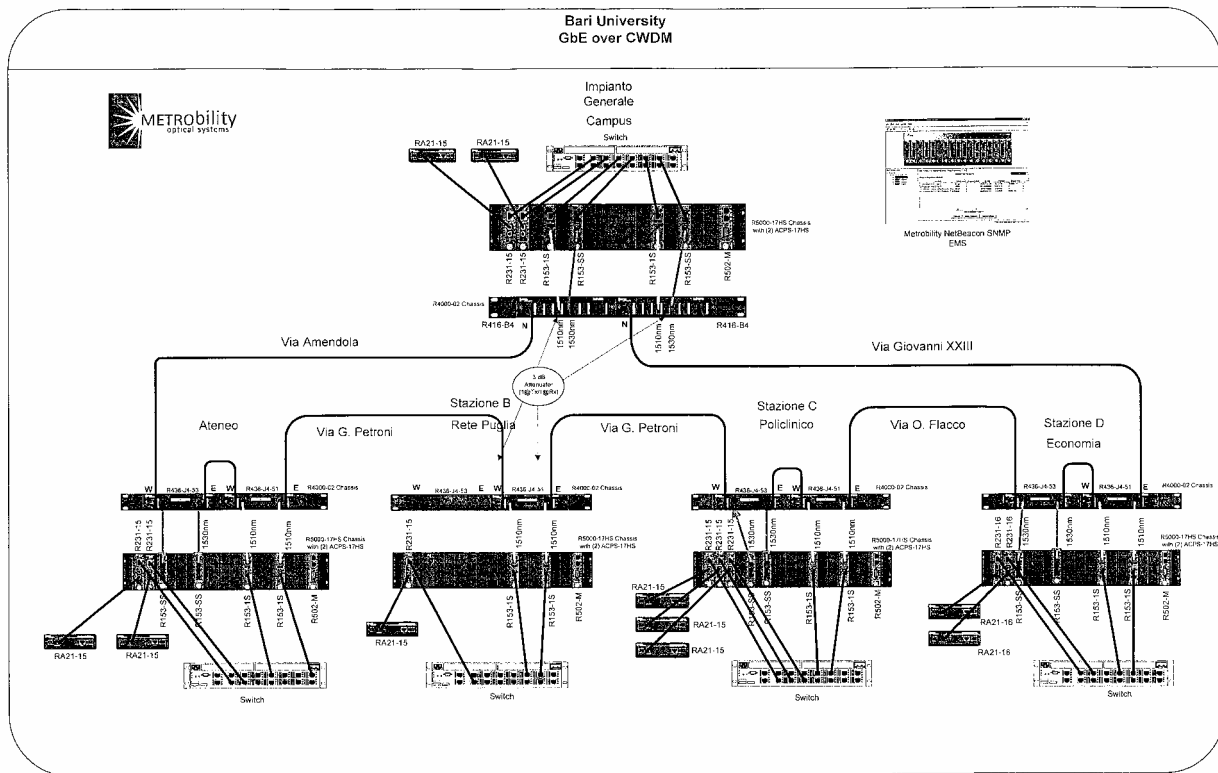


Fig. 2 CWDM Technological infrastructure

In Fig. 3 the ring of the 5 poles of the University, allocated in the city according to the map in Fig. 4, is reported.

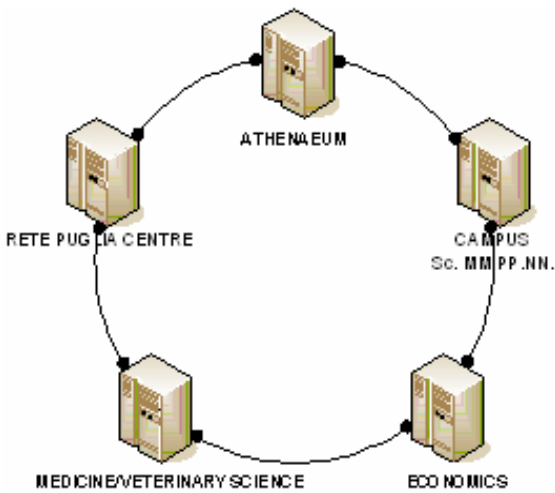


Fig. 3 Bari University poles

A set of 18 territorial poles (AC) has been equipped each one with an integrated multimedia desk [10, 11] allowing both in presence and distance learning for the Bari University. Both Concentration Centres (CC) and Specification Centres (SC) have

been installed in the “Rete Puglia Centre” and they include 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 Lectora Publisher as course maker, on Apache as the web server and on Oracle iLearning as learning content management system [12].

A gigabit Metropolitan Area Network (MAN) connects the Centre with the teaching rooms [9]. 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. PP. and NN. Sciences, Medicine and Economics Faculties) with the “Rete Puglia” Centre.

A portal with the home page in Fig. 5 and site address: <http://www.web-learning.uniba.it>, gives all the students access to the platform to visit the stored pages and to develop e-learning activities.

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

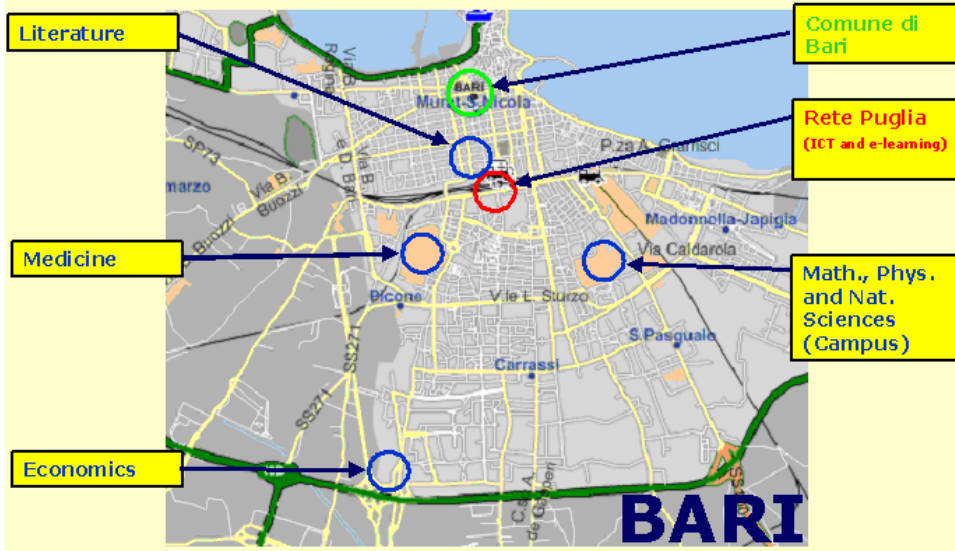


Fig. 4 Bari University Topology



Fig. 5 The web portal home page

3 e-learning course preparation

In this section some experiments in preparing learning objects for e-learning courses are reported.

The learning platform [13] stores the Learning Objects (LO) produced by using the course maker “Lectora Publisher”. It 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 can continue 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 students’ answers to questions prepared by the

teachers.

Some of the first learning objects have been developed by S. Impedovo, G. Pirlo and G. Dimauro for the Operating System course. It consists of all the learning objects related to the Introduction to Processing Systems, the Introduction to Operating Systems, the Processes, the Process Management, the Concurrent Execution, the Scheduling, the Memory and the File System. All the LO are stored in the site of Mathematical, Physical and Natural Sciences.

G. Pirlo has also produced the learning objects for the course of Office Automation and G.

Dimauro for the course of Multimedia System; while S. Impedovo developed Learning Objects for the Intelligent Systems course treating topics on Introduction to Discrete Systems, z-Transform and Discrete Systems, Discrete Fourier Transform, and FFT Algorithms. All these learning objects are stored in the Science site.

P. Camastra, P. Fedeli and M.R. Grattagliano [14], initially afforded the production of some learning objects on the methodologies and statements for a basic course of Latin Language and more specifically treated the Ancient Latin Language and investigated the obtained results in terms of benefits for learners. Successively some other experiments for learning object preparation have been developed by P. Camastra, P. Fedeli, M.R. Grattagliano and M.G. Lucchese [15]. The paper presents and focuses on the theory and techniques of translation within a basic course of Latin Language. All these learning objects are stored in the site of Literature and Philosophy Faculty.

The learning object produced by Vittoria Bosna [16] entitled: Going on a trip to Apulia through Images is stored in the Education Science site. The paper presents a panoramic virtual visit, both by historical and geographical point of view, in the Apulia.

Some experiences for the Medicine Faculty directed to Biology students have been also developed and the results are reported in a paper on Human Anatomy published by M.S. Di Comite, V. Fanelli and A. Favia [17].

Specific attention has been devoted, to the aspect concerning the evaluation of e-learning activities.

S. Impedovo, G. Dimauro and G. Pirlo [18] address some of the most relevant issues concerning quality and the main actions performed to support high quality in e-learning products and processes. Quality evaluation is performed according to the UNI EN ISO 9000-Vision 2000. For this purpose, a "quality model" has been used to determine the effectiveness of the courses and of the formative process, according to standard methodologies. The experimental results demonstrate the possibility to create a positive learning environment if adequate ICT systems and technological/methodological supports are provided.

S. Impedovo, M.G. Lucchese and G. Pirlo [19] study the most relevant issues to be pursued in test construction; they also present the most valuable benefits on the carried out e-learning university courses, by means of e-examinations.

S. Impedovo, R. Modugno and G. Pirlo [20], starting from the analysis of the main characteristics

of e-learning processes, propose an effective framework for the evaluation of e-learning activities. The framework is based on activities that involve all the main stakeholders of the e-learning activities according to a closed-loop strategy whose finality is the continuous improvement of effectiveness and efficiency of e-learning. Some experimental results demonstrate the validity of the proposed framework in determining the continuous improvement of the e-learning environment.

G. Dimauro, S. Impedovo, G. Pirlo [21], utilizing virtual reality paradigms, explored the representation of several different virtual environments and their introduction in some Learning Objects.

4 Conclusions and perspectives

In this paper several LOs for promoting e-learning activities in the University of Bari are reported. Now in order to improve the performances of the learning system, it is necessary to integrate the contents of the developed LOs both with the knowledge actually available in the www and the knowledge retrieved from other learning objects that will be specifically produced, blending all with a specific model of the Gagne's cumulative learning theory like for instance the one adopted for the educational help desk for mobile environment that has been recently proposed in literature by G. Mavrommatis [22].

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