

Virtual Learning Institution: A Distributed Model for Networked Open Learning for the Purposes of Lifelong Learning

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Abstract

Distance education via the Internet has been greatly developed during recent years. Large numbers of educational institutions use the Web to develop programs that lead to academic degrees. Furthermore, a considerable number of companies use the Internet and Intranet in order to develop educational programs within the company. The use of the Internet for educational purposes has increased the number of educational programs offered in the framework of distance learning. However it should be noted that this new educational setting (and the educational programs offered through it), may function as an alternative educational form for those who cannot take part in traditional educational forms for various reasons. Usual common characteristic of these programs is that are products of a single institution. Education via the Internet allows for the development of flexible educational programs, which could be developed by more institutions. The success of an educational program either in its traditional setting or its virtual setting is determined by a number of factors. The comparative advantages of the Web based learning are the way of delivery of the courseware material, the development of effective communication (in the new electronic environment) among all partners involved in the educational process (tutors, students, technicians etc.), the use of modern pedagogical methods based on the constructivist approach (problem based learning, collaborative learning) and the possibility of access in on-line digital libraries and other multimedia educational resources.

This paper presents a flexible distributed model of providing education via the Internet, adjusted to the needs of lifelong learning. This educational model is designed for users who want to continue their studies either for carrier development or to maintain their current job position or to redefine their position in the labor market.

Keywords: Networked Open Learning, Lifelong Learning, Distributed Learning,

Introduction

There is an increasing demand for education from companies and the individuals due to the new technologies and the new economy's characteristics (Kirkpatrick & McLaughlan 2000; Lytle, 1999). The evolution of information and communication technologies changes drastically the established organizational procedures of companies and organizations as well as the forms of employment of human resources (insertion of new technologies in the workplace, more flexible job description etc). The use of these new technologies enables enterprises and organizations to function with networks, geographically distributed nationally and internationally. These changes require acquisition of new specialized knowledge and skills. This is the reason why during the last years has opened in all the developed economically countries a dialogue with regard to the importance of education for the dynamic employability of the human capital and the competitiveness for the companies and organizations (Cresson, 1995; Kirkpatrick & McLaughlan 2000; Lytle, 1999; European Commission White Paper, 1993; Report EC, 2000). This fast paced demand must be met in a just-in-time basis in order to correspond to crucial issues for the business activity and in a rational cost, without interrupting or disturbing the normal work life.

The cost of traditional form of education and training is particularly high for companies seeking to train their personnel. Gathering workers or employees in a classroom for corporate training and education or for follow-up academic courses is difficult and exceptionally costly. Attending on campus courses is also costly for individuals (Stamatis et al., 1998). Companies and individuals operate more and more in an electronic environment. Networked Open Learning in the near future will be a very important alternative for providing educational programs to companies and individuals (Kirkpatrick & McLaughlan 2000; Lytle, 1999).

Networked Open Learning (NOL) or simply Networked Learning (NL) (Banks et al., 1998; McConnel, 1999) is the educational form that covers all forms of delivery of educational programs in which the following features are crucial:

- people ('tutors' and 'learners') communicate using computers linked to networks
- people access resources stored on computers linked to networks

NL is also used to denote a paradigm shift in learning where computer technology and networks are used to facilitate new forms of learning that are not only learner-centered but are also strongly based on collaborative approaches ((McConnel, 1994).

The geographical dimension in Networked Learning is not an important one because more important from the distance is the way the educational material is distributed, regardless if the participants are at the same place or not.

The success of educational programs offered through the WWW requires a detailed design of all the components of the programs (Lawhead, et al. 1997) and especially those concerning the characteristics of the new media (such as interactivity, adaptability, development of multimedia applications for educational purposes, development of educational applications with the use of virtual reality, allowing access to larger audiences (Dede, 1996). Relevant components of the programs are (Lawhead, et al. 1997):

- The process: including planning, selection of the learners, administration etc.,
- The content: the quality of the program from an academic point of view. The courseware material must include all the issues of the subject matter, with exercises, case studies in order to promote motivation and interactivity among students. It must be regularly updated and linked with other relevant resources
- The delivery: the selection of the technologies used and their efficiency. Appropriate hardware solutions must be selected for 24×7 (24 hours×7 days) delivery, as well as the selection of the virtual learning environment (friendly for the student, adapting effective pedagogical methods such as collaborative learning etc).
- The cost: the cost-benefit efficiency. The overall cost of the program must be competitive with other forms of education. Parts of this cost are the cost for the development, the cost of delivery etc. NL as it is mentioned above allows access to larger audiences. This means that economies of scales can be achieved.

In order for an educational program to be effective, it must be flexible and adjustable to the educational needs and the specific characteristics of each user (i.e. if the users attend an educational program in order to obtain new knowledge for career development, or to maintain their current position or to be competitive for a new job description). The specific characteristics for each user refer to family engagements, social activity, personal way of learning etc. Sometimes, external factors (labor market etc) warrant some sort of certification, in other words to formally certify the acquired knowledge. Thus, the model to be used for the development of an educational environment must be open and flexible and must take into consideration the user's characteristics and the (characteristics of the technologies used to support the virtual classroom activities). In other words, this model focuses on the characteristics of the users, as described below, and creates a learning environment, which is adapted to them. These learning environments concentrate more on knowledge and how to obtain deeper understandings.

The target group for the model in this paper is working adult learners. These learners have special educational objectives resulting from their working environment or individual career objectives. These learners want to have the control over the time, the place and sometimes the content (according to their needs and personal perspectives) of their learning activity. A NL course should be adapted to each user's learning needs and should be connected to each user's personal objectives in a logical time framework.

The second element of the model deals with the supporting medium and the technologies it uses. The most common and cost-effective platform for the provision of distant education is the World Wide Web. The Internet/WWW tends to replace every other medium of providing distance education, due to its low cost and the effectiveness. The Internet/WWW and its technologies can accommodate the development of an institute for distance educational programs, which is functionally designed as a distributed system.

Distributed Networked Open Learning

For the provision of a distant educational program via the WWW, the involved parts are:

- The tutors and other supporters of education
- The courseware material (interface and databases)
- The technological infrastructure (server)
- The trainees

Training via the Internet allows us to redesign the traditional models of providing education. By not having to be in one location, the Internet allows for extended co-operation amongst educational providers by developing collaborative educational sites in the cyberspace (Kagawa & Kambayashi, 1997). In a distributed educational system, all of the above parts must be decentralized (Dede, 1996a,b). The advantages of such a design are many, including (Bouras et al., 2000; Kargidis et al, 2000):

- The participation of more tutors and other specialists from different institutions and with different backgrounds (enhancement of the students' educational experience).
- The courseware material developed by the co-operating educators is enhanced because it is based on the specialized knowledge of many. Such an approach also improves the timeliness of a course, especially if it is in areas where the subject matter changes rapidly.
- The workload for producing and the responsibility for supporting the educational process may be distributed into several parts.
- Ability to develop flexible educational programs based on the characteristics and needs of the user. The material can be retrieved from different distributed databases. An example can be the various educational consortia where different institutions contribute different learning units of a course (IEEE LSTA, 2001; IEEE LOM, 2001; IMS, 2001; Koper, 2001).
- Ability to design several kinds of programs which can lead to certification and cover needs for lifelong learning.

A potential problem created by Networked Learning systems is the lack of coordination (e.g., explicit description of each participant's role, regarding the material to teach and the evaluation procedure, the credit transferability, the structure of technical support and other administrative issues which can destroy the whole process).

When developing distributed NOL the following points are significant (Kargidis et al, 2000):

Distributed development of courseware material

The term "distributed development of courseware material" refers to the process during which tutors and other specialists from different geographical locations, and educational organizations, cooperate in order to produce a NOL course.

This process is considered especially suitable when the two following conditions apply:

- The scientific or knowledge domain of the course requires a multidisciplinary approach.
- The target groups are at a postgraduate level or follow a lifelong educational pattern.

The ability to have specialists always present, when the development of a new course that covers dynamically emerging needs in a specialized multidisciplinary domain is required, cannot always be possible in a typical educational institution. In a distributed model (a consortia of institutions) there is a better chance of producing courseware in areas where the subject matter changes rapidly, if you have a large group of experts. They can contribute important and diverse views in a particular scientific area enhanced with experiences from the real world. Thereby your chances of including the cutting edge, state-of-the-art materials are improved. This is especially so, when communications are carried on via the computer. The computer can act as a medium for talent and resources.

The use of methods based on co-operation via computer networks (Network Mediated Collaborative Work) is an effective solution (Nunamaker, 1999). For the development of shared courseware material, we can distinguish the following points of importance:

- The design of the content of the learning material (all the important issues of the scientific field, regularly updated with relevant links to additional recourses for further information), the corresponding databases that support the whole program and the features of the virtual learning environment (IEEE LSTA, 2001; IEEE LOM, 2001; IMS, 2001; Koper, 2001). The learning environment must support synchronous and asynchronous learning activities, modern pedagogical methods (such as collaborative learning, experiential learning etc.) and effective communication between all that are involved.
- The development of the educational material (with the use of new technologies, multimedia, etc.) and the evaluation system for both the students and the program (Kargidis et al, 2001). It is very important to use the appropriate technological tools and applications in order to facilitate and motivate students' interactivity with the educational material and to fight any frustration that could occur. In order to evaluate students' performance, online tests and collaborative project work must be designed carefully.

Distributed Delivery of the Course

The term "distributed delivery of educational programs" refers to the process during which, education is not provided by only one provider but by more. It also means being able to instruct over broad geographical areas asynchronously. In one interpretation, every tutor may offer the part of the courseware material which developed. Another way of employing a distributed delivery model is to have some teachers contribute in the process of developing the courseware material and others to facilitate the course.

This model raises some technical issues. For example, the places of transmission of the courses must be accurately defined, that is, it must be specified whether the course will be offered from one spot (server) or from the place where each tutor is located. When a course is offered from more than one location, it is suggested that a course leader have administrative responsibility for all the people involved.

The students, on the other hand, do not have only one tutor whom they can turn to for advice but they can rely on experts who cover specific areas of the course.

All of the above are organized in the context of a “virtual classroom” (Harasim, 1999; Haugen, 1998), which is implemented with the use of a WWW educational server that takes care of all the Internet communications needs. The solution of the usage of Intranet is limited to companies with a certain size. These companies have established a department for education and training which produces educational material for the needs of the company.

Distributed collaboration among trainees

In such a model of distributed education, the pedagogical method to be followed should be based on the collaboration among the trainees (Dede, 1995) in a way that they share their own knowledge and experiences.

Networked Open Learning courses help trainees to be more active since they have to communicate with the instructor and peers for various reasons. Trainees are encouraged to exchange knowledge gained either from ongoing course units and from their experiences or form material (information) they can get on the net (i.e. digital libraries).

The model

The development of the NOL model is based on the experience acquired from the DoODL (Dissemination of Open and Distance Learning) and Eurocompetence programs partly funded by the SOCRATES program during which, educational programs and courses (e.g. Strategic Internet Marketing) on a distributed basis, were offered. Figure 1 presents an Internet educational environment.

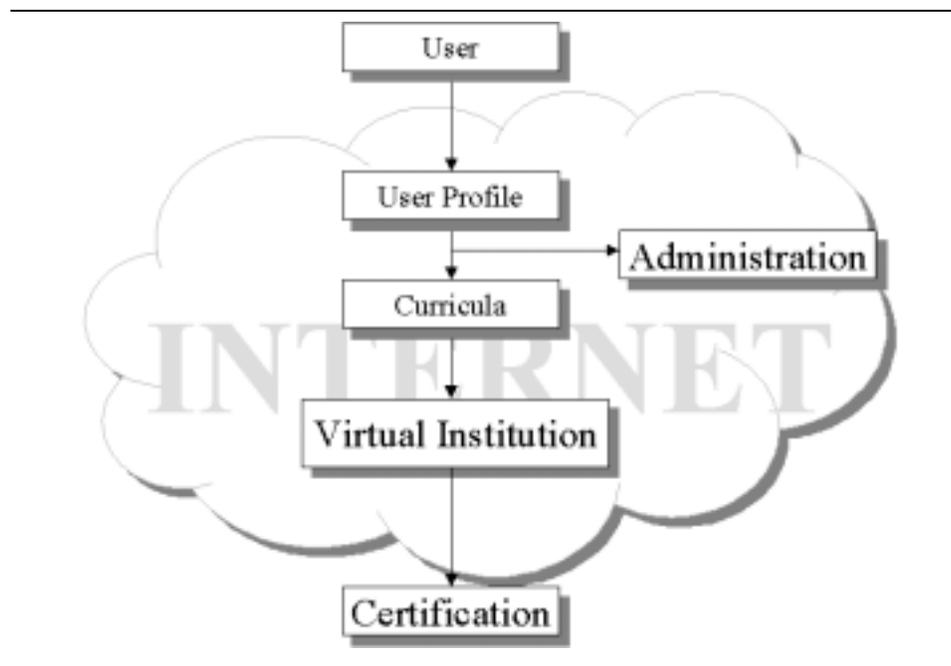


Figure 1. An Internet educational environment.

The student addresses to an educational organization where he/ she describes his/-her learning need /objectives. The educational organization through a diagnostic process (profile test), tests the knowledge of the trainee that is relevant to the subject. This knowledge is a prerequisite for assessing the trainee's needs. Then, by comparing the prerequisite pieces of knowledge to the desired ones, the program to be followed by the trainee is designed. In most cases, the trainee is led to a typical curriculum. The successful completion of the education leads to the certification of the trainee's knowledge either formally (academic title, degree) or informally (knowledge certificate).

A distributed education model via the Internet is shown in Figure 2.

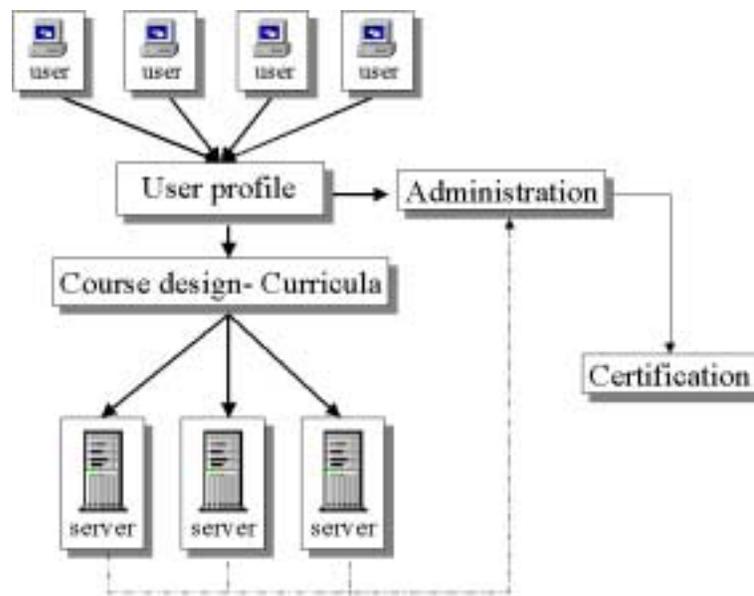


Figure 2. A distributed Internet educational environment.

In the case of the distributed model, a user will follow the same steps of the diagnostic model to determine prerequisite knowledge and program design. Then, the same way as the administrative processes, registration, student records, etc. are hosted in a main server. Next, a user will be taken to a system of distributed servers in order to attend the program, which is designed according to the needs /objectives of the user in accord with her prerequisite knowledge. The main part of the courseware material resides in one of the servers but a significant part of it can be retrieved from other servers, which communicate each other following the material's requirements. The successful completion of the program leads to a certificate, formal (master) or informal, according to the needs /objectives of the trainee. The gathering of information for the students' performance and the certificate awarding is done by the main server, which holds all the trainee records (Manitsaris et al., 2001). Parthasarathi (2001) develops a model for self-searched curriculum based on epistemic queries.

In the distributed model of education via the Internet, a number of institutions could cooperate. For the development of such a system, the existence of a main server, which will process trainee profiles, as well as all of the administrative work described above, is required. The courses reside in the Institution's servers. In each server the interface (common to all courses) is installed, as well as the relevant databases for courseware material. These databases are accessed and coordinated in order to create customized programs. For the development of the courseware material and the delivery of the training program, tutors and other specialists cooperate, as mentioned above.

A model of institutional cooperation is shown in Figure 3.

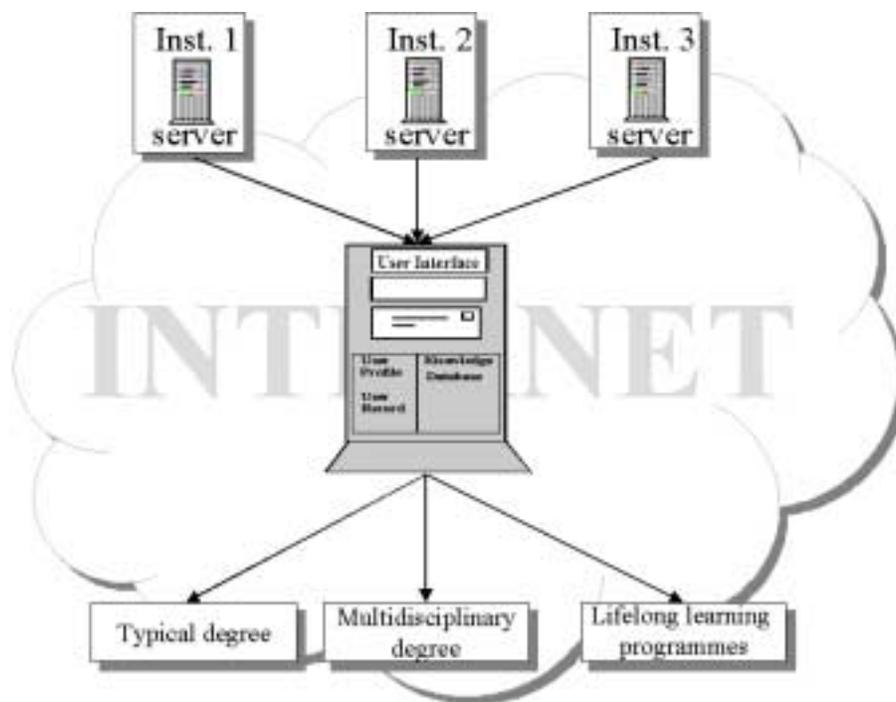


Figure 3. A model of institutional cooperation

The operation of the virtual classroom and all of its activities are shown in figure 4.

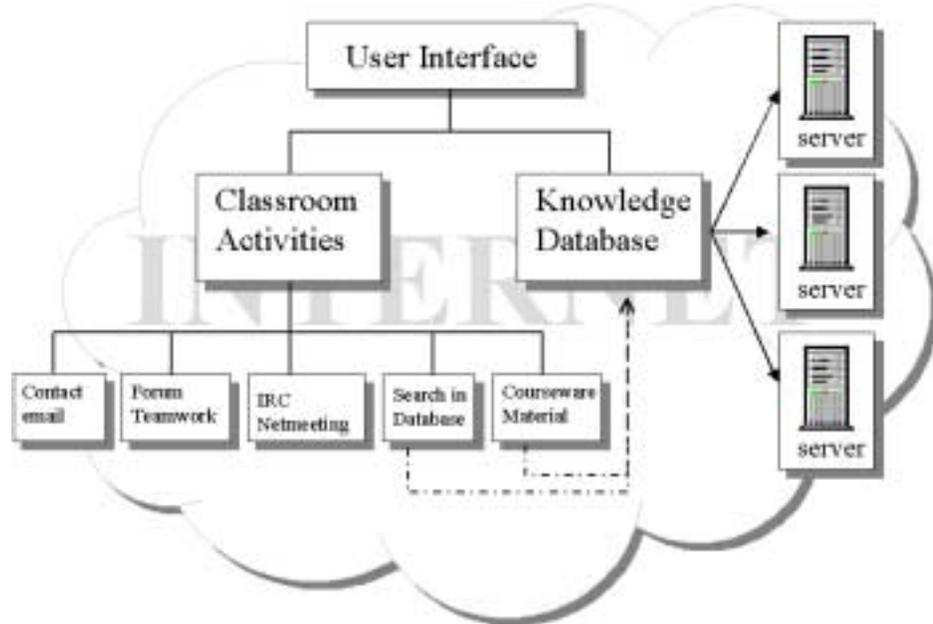


Figure 4. The operation of the virtual classroom

A virtual classroom is defined by the place where the courseware material is provided, the place (forum) where collaborative learning activities are developed (Neal, (1997), the ability to search for additional information from the databases and the ability for asynchronous communication via e-mail or synchronous communication via IRC, when needed. In all these activities Institutions participate in such a way that the program is enhanced with knowledge and experiences of persons with different backgrounds and experiences.

The solution of the administrative problems requires new approaches, development of appropriate software, development of a well trained work force, staff for technical assistance etc. A systematic analysis of specifications for the development and management of NOL tools is given by Mikalsen et al (1998). A complete system of automatic/semi-automatic support for operations of a NOL is given by Stamatis et al.(1999) in there paper “A Multi-Agent Framework to Assist Networked Learning” where a management system based on the technology of intelligent agents, is proposed.

Conclusions

Nowadays, because of the Internet distance education has been transformed drastically. Employees and companies can satisfy their needs for lifelong learning, through programs offered by Institutions that provide NOL education (Universities, etc.). These programs are parts of the typical educational curricula that lead to academic degrees or training programs that lead to a certification.

The Internet provides the dynamic platform for the development of extended co-operations that can pave the way for the design of flexible educational programs capable of addressing the new demands of the market. The success of educational programs offered through the WWW requires a detailed design of all the components of the program and especially those concerning the characteristics of the new media. These issues are more crucial when educational programs are offered in a distributed manner, as a result of collaboration between institutions. This form of collaboration presents some advantages such as:

- the possibility to bring together tutors and other specialists (from the different institutions and other organizations) for all the learning activities,
- the ability to offer custom made learning programs which lead to degrees or certification,
- the possibility to reduce the total cost of the educational programs,
- the possibility to meet more markets (which means important economies of scale) etc.

Flexibility, decentralization and low costs could be achieved through the Information and Communication Technologies and especially through flexible-open learning frameworks based on the Internet. The World Wide Web allows the development of new forms of education based on modern pedagogical methods i.e. constructivism and collaborative learning (where the trainee has a significant control on how he/she learns) by using attractive and effective technologies in terms of capabilities and involved cost.

There are some other issues for further research:

Administrative issues: the regulation of the provider (consortium of institutions), institution where the students will be enrolled and which institution will deliver the certification (formal or not) of the obtained knowledge, transferability of academic credits or learning units, etc.

Financial issues: cost determination for the educational procedure (courseware development, teaching activities), billing or pricing policy, which will provide viability, etc.

Technical issues: technical specifications for the technology to be used (compatibility), technical training on the characteristics of the technology to be used, technical support for all those involved (tutors, trainees), etc.

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