

The University of the Future Towards an integrated and open Teaching-learning process

*by
Maria Amata Garito*

*Professor of Teaching and Learning Technologies at the University of Rome "la Sapienza"
and
Director of the Network for the Distance University: NETTUNO*

Abstract

The information science revolution has brought about a shift from an information society to a cognitive one. On the one hand, the features of its new technologies create new educational and training needs, and on the other, they offer new solutions both to meet those needs and to build tomorrow's society. We are experiencing a cultural revolution which, thanks to the extension of information and telecommunications network, is already challenging the institutional and traditional models of both school and University. Training opportunities, easily available today thanks to new technologies, allow for learning knowledge and skills outside traditional educational or training facilities.

In this context, the University must accept the challenge and adopt effective strategies to respond successfully to new needs and reach new users.

The challenges universities face in a knowledge-rich society.

New communication technologies greatly increase access to knowledge. Telecommunication networks, satellite television, Internet and virtual reality modify processes of communicating knowledge as well as their acquisition. Widespread channels have been created which offer new possibilities for a fully democratic access to training and education. This new potential marks the passage from an information society to a cognitive society. We are going through a social and cultural revolution which challenges traditional, institutional models of schools and universities. Training courses now available due to new technologies allow for the acquisition of knowledge and skills outside traditional educational facilities. Anyone can learn through telecommunication networks. Faced with these processes for change which increasingly characterize this phase of transformation, educational institutions must constantly innovate subject content, reorganize curricula, decide on new development policies tied to the requirements of a flexible, international job market. At the university level, it is clear that there is a need for university education to carry out a new function, that of continuing education and of developing the instruments and mechanisms necessary to do this.

What attracts individuals today to higher level continuing education courses is not the same as in the period after World War II, when further training allowed one to be promoted to a higher level of the production chain. Nowadays the aim is to rapidly gain specialized skills which will allow one to find a new type of job in a changing system. This requires universities to be able to impart knowledge "just in-time", in constant flux, which they were not set up to do. Apart from changes in contents, it is necessary to rethink teaching and learning models and methods due to the profound modification which new technologies have brought to the new ways of transmitting knowledge. The university, an institution which for years has satisfied the need for higher education, must therefore find new strategies which allow it to respond to new situations and reach new users if it wants to maintain a role fitting to its tradition and potential in cultural and social development.

If universities do not face this challenge, they risk following the same path they did concerning research. In the post-war period, most European universities lost their role as principal producers of knowledge. Applied research was developed mainly in public research institutes and in large industrial plants provided with prestigious laboratories which were often financed by national governments. Research was oriented to the development of products responding to market demands. The sometimes negative consequences of this process are evident.

Going back to education, it is necessary to note that today there are many agencies outside the university which have set up advanced training facilities and organized their own distance teaching systems based on the utilization of new teaching technologies. An analysis of contents and psychopedagogical models of these training courses make it clear, however, that in many cases training endeavors are not oriented towards developing knowledge and skills in a critical and problematic way.

Thus we have within the information society the development of an extended and open educational and training system with considerable potential but containing high risks as well.

As far as traditional educational facilities are concerned, there is the risk of progressive decay if no profound changes take place. If universities want to maintain a key role in transmitting knowledge they must:

- pinpoint new policies of intervention to respond adequately to training needs through an increase in flexibility;
- redefine their functions to compete in a new context and in the new environment of the information society;
- modify the professional role of teachers;
- compare the parallel and separate programs they have been developing.

In other words, in universities there should be a mechanism for transferring innovation which is comparable in commitment and breadth to what takes place when new technologies are introduced into an enterprise, changing the facilities, production processes and professional skills. Industrial production models have all evolved into new flexible models as a consequence of the use of new technologies. The same evolution should take place in the training system; the rigid division of training paths should be abandoned for a more open and flexible system.

This is the challenge which all educational institutions must face. Universities can successfully respond to this challenge thanks to some of their distinct features: the fact that they are both research and teaching centers can play a key role in order to define new means and ways of communicating knowledge using new information and telecommunication technologies to activate new, flexible, diversified teaching and learning processes. And they can carry this out guaranteeing both quality and freedom in the training process, thanks to the strength of their traditions and independence.

The framework outlined above includes the transformations being brought about and the experience being developed in the construction of new models. It is happening within single universities and between different universities through cooperation programs. In the latter case there is greater potential for planning and creating innovations, starting from the process of involving more than one campus in a common project.

The NETTUNO Model

The Network for the Distance University, NETTUNO, an organizational and didactic model run on a cooperative basis, is a consortium of 38 public universities, supported by major telecommunication companies. The consortium structure allows these universities to play a leading role in the innovation of products, processes and facilities, in improving the flexibility and adaptability of products and in increasing students' autonomy, modifying teachers' functions and evolving facilities which can be utilized either face to face or at a distance. The consortium allows university campuses to maintain their position as leaders in research and knowledge transmission in this new model. Bringing different universities together offers a high-quality pool of human resources and knowledge to select from in a wide variety of sectors. The presence of enterprises gives the world of education the chance to become more closely tied to the world of production by linking teachers and users and responding to the new continuing education needs of human resources.

Thanks to telecommunication and satellite technologies, which eliminate distances between countries, this model can be extended throughout Europe and elsewhere, enlarging the pool of knowledge and skills, bypassing national boundaries and recreating the model of university which gave birth to European culture: the medieval university.

The Nettuno model (Network for University Everywhere NETTUNO) has the objective of setting up a distance teaching model which involves both teachers from traditional universities and produces educational possibilities which respond to different needs.

The training offered features quality instruction imparted by the best professors from traditional universities who are wholly responsible for the distance teaching/learning process. Teachers carry out the same functions for distance students as for traditional students, adding specific features which are coordinated by all the universities in a given group. This is the most innovative element, as it involves the best and most open-minded teachers in a joint didactic project.

Nettuno's organizational model and its facilities (National Center, Organizing Universities, University Technological Centers, Home Work Stations, Technological Poles) allow for a diachronic and synchronic teaching/learning process. Teaching sites are no longer only university classrooms but are open, virtual and real: homes, work places, study centers. Through technologies which allow for the management of the distance teaching process (video libraries, computers, modems, fax, telecommunication links, satellite television, Internet, ISDN, virtual laboratories) these areas, the so-called Technological Poles, act as incubators for innovation and are also utilized by students and teachers in face-to-face courses.

Technological Poles, installed in companies, allow personnel to enrol in Nettuno courses not only for the purposes of professional retraining but also to obtain university diplomas. Home work stations allow students to consult multimedia databases, ask tutors and teachers questions by telephone or other forms of telecommunication technology, reserve, receive and store material from video-lessons to virtual laboratories, and to access all didactic and administrative information.

This model has brought about the creation of a network and the transfer of knowledge not just from one institution (an organizing university) to a group of students spread out in a vast geographical area, but also from different institutions (Technological Poles) to single learners or organizations.

The advantages for learners are linked to the vast array of courses available, combined with flexibility of space and time, which all facilitate learning processes. The advantages for the network partners (universities, companies, professional organizations) lie in the comprehensive offer made possible through relatively limited efforts by each partner. Sliding budgets make the development and transmission of learning material cooperatively profitable.

Mixed Didactic Model

A significant aspect of the Nettuno model is its "mixed" nature - of cooperation among traditional universities and the enrichment of their face-to-face teaching methods by innovative, distance methods. This functions as a competitive stimulus and shifts the balance between them, not through a prior set of rules but rather through the experience and qualification acquired on the spot.

"The difficult synthesis between interaction and independence which gives a student didactic and cognitive autonomy and a considerable level of independence in organizing his/her time" is achieved through this mixed model.

Reflections on Transformations in Teaching and Learning Processes

Nettuno's experience, as well as that of others, allow us to outline the transformation taking place in teachers' functions and students' work.

Teachers

We have been able to verify that technologies applied to university didactic activities are active factors in teachers' work, which modify their modes of conceiving, planning and carrying out their teaching activities.

Thus the responsibilities of university professors are transformed and they are no longer privileged dispensers of knowledge. Professors have the double function of teaching by television and also performing support activities through diverse technologies and telecommunication systems.

The use of the television brings about a change in traditional didactic communication. Here professors are induced to find new ways of explaining, synthesizing and presenting their knowledge to virtual students in order to start up a critical and reflective learning process. Video-lessons require special preparation and professors must work together with technicians and language and image experts to fully exploit the potential of the media.

It has been calculated that each video hour requires from twenty to thirty hours of preparation. Teachers have thus naturally developed new communication skills and the knowledge of new languages which are useful for storing their research results and teaching in their traditional academic classrooms as well. Professors have learned to create new models of books, plan and create multimedia products and virtual laboratories, teach in video conferences, create teaching sites on Internet and guide students in self-learning processes with non-traditional tools, methods and technologies.

Not to be overlooked is the fact that in open environments professors are exposed not only to their students' judgements but also to those of their colleagues and of anyone else following their lessons on television or on Internet.

Students

Passing on to students, we have been able to verify how even in the Nettuno laboratory the learning process is being profoundly modified. The Nettuno model, cooperative and mixed, is in fact an important laboratory of emerging modifications. Today Nettuno, thanks to the development of new technologies and their integration, offers through Internet complete learning environments where four different knowledge transmission methods are implemented:

- digital video-lesson, in this environment students use a linear learning model still tied to classical teaching methods;
- virtual media library, where hypertext methods are used to study from and consult books linked to various subjects covered in the video-lessons;
- virtual laboratory, where students can increase their knowledge according to "learning by doing" methods, assisted by an interactive tutoring system;
- Internet: through online discussions students can activate collaborative learning and share the training phase with different linguistic and social groups.

The four modes are "hosted" in a single site, a "virtual" site in which learners can cultivate their own personal aptitudes, enter one of the four areas and use all that is available for the didactic path. Learning activity is structured in such a way as to avoid dispersion and confusion and to enhance transfer of knowledge, skills and experiences in a context in which the guided path allows one to go:

- from the simple to the complex;
- from theory, to learning by doing;
- from individual study, to interactive dialogue between teachers and students (and among teachers);
- from guided exercises, to Web searches.

By observing how students "travel" in these complex and varied paths it is possible to verify how learning processes are being modified.

In integrated, open environments students personalize all paths and interact with different materials to carry out a multimedia and hypertextual study strategy: they interrupt the video-lesson to consult virtual data banks and texts in the media library; carry out practical activities in virtual laboratories to transform theoretical knowledge into practical skills; surf on in Internet to enrich contents

with information which can come from different cultural and linguistic environments; carry on conversations through "Forums" to enact real virtual meetings between teachers and pupils from different world campuses, activate exchanges and comparisons and have access to diversified skills. In didactic cyberspace a universal group spirit is created among students.

The university is thus transformed from an isolated system which is divided up into classes and subjects and a system of repetitive preordained knowledge, into an open system capable of updating itself and integrating all the knowledge available.

Conclusions

It is clear that a process of concrete evolution towards a new real virtual educational community will eventually overtake traditional teaching and learning models. The fact that all Nettuno professors who have created a distance course no longer teach in a traditional way is significant. The enthusiasm that was generated in our laboratory has influenced other academic environments and encouraged us to propose the model once again on a European level. The key to success probably lies in the conscious adoption of an evolving, flexible framework in which professors and students are stimulated to take up technological innovations as they become available.

A laboratory in which to experiment new teaching methods and progressively adopt languages linked to technological developments has been made ready for use by universities.

Nettuno has followed an evolutionary path. In just a few years we have passed from the simple use of terrestrial television and computer to sophisticated telecommunication satellite technologies. The RAISAT NETTUNO satellite television channel has provided for a quick shift from different media to the utilization of one medium: computer or interactive television.

Apart from this technological development, Nettuno can count on the skills and availability of an increasing number of professors who are able to use new languages. In other words, we manage to merge technological drive with cultural knowledge springing from theoretical reflection. The availability of technological and human resources has permitted us to develop significant research activities and experiment different models in order to contribute and construct a consistent body of theoretical and operative knowledge which takes into account technological and cognitive components. Research is necessary to evolve towards a distance teaching model which can bring about a new system of transmitting skills in a knowledge-rich society: from physical mobility of professors and students to mobility of ideas. It will then be possible to transcend borders and bring about interaction among students and professors from different campuses throughout the world, globalizing culture and knowledge, creating a truly open, democratic university which is capable of developing not only new skills, but also new values. A university which operates under open skies, without boundaries: the University of the Future – the university to look at, browse through and surf on.