



## **ENVIRONMENTAL CHALLENGES IN HIGHER EDUCATION. THE CASE OF DISTANCE LEARNING**

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### **1 – THE TRAINING NEEDS ON THE ISSUES OF ENVIRONMENTAL SUSTAINABILITY**

Environmental issues are key to worldwide social and economic development. The awareness about the existence of this problem is, by now, globally widespread; however awareness by itself does not represent a solution to the problem. Today, more than ever, we need to develop study programs, from school levels up to the university (bachelor and master's degrees) in which disciplines allowing to train professionals on specific skills related to the various environmental issues as well as citizens who are aware about the reality of environmental sustainability.

Briefly, training on this issue has to meet two basic objectives:

1. Raise awareness among citizens through educational activities starting since primary school;
2. Creating specialized and innovative technical- scientific competences at graduate and post-graduate level.

And it was just starting from these considerations that the International Telematic University UNINETTUNO believed that it is strategically important to cooperate with the Water Academy to realize the Master's Course in "Water Awareness, Consciousness, Knowledge and Management". This Master's Course is structured on two main modules: Water Knowledge and Experiences (including 3 courses: **Water and the Development of Civilizations in the Mediterranean Region up to the Contemporary World, Sustainability and Responsible**

**Development, Geopolitics of Water)** and Water Awareness and Management (including 6 courses: **Water and Seas, Water in International Relations, Fundamentals of Hydraulics and Soil Conservation, Applied Ecology, Juridical Scenarios for Land Policies**). The Master's Course is aimed at:

- Providing a multidisciplinary and high-level training on the issue of water and of water resources and on the question of sustainable and responsible development;
- Offer a training focused on global values and knowledge, though having local verticalizations and applications.

The Master's Course is aimed at European and non-European students who have completed a university degree course, including those who are already in the labor market.

Course delivery will take place at distance on the Internet based on UNINETTUNO's psychopedagogic model. At present, the International Telematic University UNINETTUNO has over 16.000 students coming from 163 different countries across the world; it delivers courses in 5 languages (Italian, English, French, Arabic and Greek) and its learning platform is the only one across the world which is run in 6 languages (Italian, English, French, Arabic, Greek and Polish).

## **2- UNINETTUNO'S MODEL**

The teaching, organizational and technological model and the Web-based learning environments of the International Telematic University UNINETTUNO are the outcome of over 25 years of international scientific research on the issues of the application of technologies to face-to-face and distance teaching and learning processes.

These research activities allowed to conceive theoretical knowledge and practices allowing a right balance between the technological-engineering components and the cognitive, methodological, cultural and educational ones.

### **2.1 - UNINETTUNO DIDACTIC CYBERSPACE**

On this basis the learning environments of the Didactic Cyberspace of the International Telematic University UNINETTUNO, relying on a systemic approach, were realized. The design and implementation of the teaching processes are focused on the student and on the learning communities. The psycho-pedagogic theories being applied are mainly linked to socio-cognitive constructivism theories and allowed to use the Internet to realize constructive and collaborative teaching and learning environments whose main features are:

- Synchronic and asynchronous two-way and interactive communication;
- Student's active participation in the construction of knowledge.

In order to achieve a true collaborative knowledge construction, we realized a specific learning environment in which teachers and students compare their respective interpretations of knowledge and contribute to the construction of knowledge.

The learning environments of the Didactic Cyberspace were organized in such a way as to encourage a collaborative construction of structured knowledge, focused on individual and collective educational tasks. In the Cyberspace the students communicate their ideas and thoughts, ask questions, continuously exchange knowledge which is shared by posting it in forums, wikis, in the interactive classrooms, in the tridimensional virtual classrooms.

The student can access various training materials specifically functional to a constructive and collaborative learning. Cooperation is the focal point of every interaction among and with all the actors involved (students and teachers). In the cyberspace the students are continuously stimulated by the professors-tutors to become active constructors of knowledge. The acquisition of knowledge is dynamic rather than static, multimedia rather than linear and systemic rather than systematic. The knowledge, that each student builds, appears as the result of meetings and relations with the professors-tutors within their knowledge virtual space

In the cyberspace, designed according to a systemic approach, several learning environments were included and in each of them a training session was realized based on a specific method meant to triggering teaching-learning processes:

- **With the video lesson we use a symbolic-reconstructive learning model** linked to the teaching classic mode and, thanks to the links to various kinds of training materials, it is possible to study in a multimedia and hypertextual way;
- **With the virtual laboratories** it is possible to check and enhance one's own knowledge and skills according to a **"learning-by-doing" mode**;
- **With the chats, forums and interactive classrooms, 3D environments systems** through web-based meetings, it is possible to promote **collaborative learning** and share the various steps of the learning process with other students belonging to different linguistic, cultural, political, religious and social backgrounds.

In each environment it is possible to simultaneously integrate each single learning mode with the other ones. The learning activity is structured in such a way as to promote the transfer of knowledge according to different modes:

- From simple to complex (video lesson and intelligent library);
- From theory to applicative projection (learning by doing in virtual laboratories);
- From guided exercises to searching the World Wide Web (webographies and bibliography);



- From individual study to interactive dialogue between teacher and students and among students (collaborative learning based on communication tools and synchronic and asynchronous sharing).

## 2.2 - VIDEOLESSONS

In UNINETTUNO psycho-pedagogic model the videolessons play a major role; digitized and posted online in learning environment designed to allow their hypermedia use thanks to their indexing by issue, modularity and inclusion of bookmarks: timed hypertextual links to more-in-depth study materials related to what the professor speaks about in given section of the videolesson.

Through an interface designed by UNINETTUNO the student can navigate through the videolessons, moving from one lesson to the other, within the same videolesson, using indexing allowing to select a specific sub-issue treated by the video professor and play the video to the second in which the professor starts to treat that specific issue or among the more-in-depth materials related to that specific video lesson, by means of the box at the right of it.

In addition, in some specific moments, a bookmark, a lighting signal highlights one of the types of more-in-depth study materials listed in the box at the right of the video, indicates to the student that a specific more-in-depth study material associated to what the professor is speaking about in that specific moment of the videolessons. This way, the learning process becomes an hypermedia process: the student can access more-in-depth contents suggested in real time by hypermedia bookmarks structured by UNINETTUNO professors and researchers that allow him directly access to books and articles, that is to say texts, lecture notes, produced essays, selected and made available by professors and tutors, CD—Roms, multimedia materials, photo galleries, films associated to videolessons; bibliographical references and selected lists of websites, collections of references to external materials validated by professors and tutors experts of each single course in scientific terms.

## 2.3 – COLLABORATIVE LEARNING IN INTERACTIVE CLASSROOMS AND 3D VIRTUAL CLASSROOMS

Great importance is attached to the collaborative learning activities that take place through the system of **Interactive Classrooms** as well as **in the tridimensional worlds of the Virtual Classrooms on Second Life** available on UNINETTUNO's platform.

These two collaborative learning environments both allow to adopt the “*flipped classrooms*” pedagogic model: students are led to acquaint themselves on the issues related to the planned discussion; then they study the video lessons, the reference texts, the books, the lecture notes, articles, essays, thus preparing themselves to face the debate with teacher-tutor.

## 2.4 - 3D VIRTUAL CLASSROOMS

The **3D Virtual Classrooms'** environment, by handling variables such as space, the roles and interaction among the avatars of actual individuals, creates a setting that is characterized by a strong sense of reality in which the actual individual-avatar figures out the potentials for interacting with the environment and with the other avatars that are present. The individual is immersed in a new dynamic reality in which he is not a mere viewer, but a protagonist. The experience made in this reality is highly emotional and is deeply involving; the individual is "attracted" into a new virtual world which has all the features of the real world. In this tridimensional virtual world the students and professors/tutors' avatars meet and take their places inside the classroom where the avatar of the teacher-tutor asks question to the avatars of the students in order to assess their skill level. In this phase the questions being asked are of greater importance than their relative answers; they represent the bases on which the discussion starts, or better the *disputatio*. With the *disputatio* – inspired to the educational model of the medieval universities– they promote a learning process arising from dialogue and discussion, they learn from others and reflect upon their own ideas.

In the three-dimensional virtual classroom of UNINETTUNO's Island of Knowledge, students and teachers-avatars develop learning processes experimenting a new immersive-collaborative learning dimension. The students use interactive tools, they make practical exercises, mid-term assessment tests, dialogue and learn in a cooperative and collaborative way and become active constructors of knowledge.

Learning becomes a process involving the student in thinking about and conceiving multiple perspectives and viewpoints. In their approach to knowledge, they promote creativity and critical appreciation. It is interaction, dialogue and exchange which add value to this type of learning. The 3D environments and other immersive worlds allow for penetrating into the digital body to perceive oneself no longer as a person sitting before the screen of a PC, but, actually, as being in a virtual classroom animated by actual teachers and students. In the Island of Knowledge debates and conferences among students, experts and teachers coming from other universities around the world take place. In these virtual spaces social, entertaining and recreational aspects are experienced as well.

## 2.5 – INTERACTIVE CLASSROOMS

In **UNINETTUNO Interactive Classrooms** teachers and students utilize interactive tools, they carry on practice work, mid-term assessment tests, exam simulations, they discuss and learn in a cooperative and collaborative way and become active constructors of knowledge.

UNINETTUNO Interactive Classrooms allow teachers and students to adopt various educational interaction modes, beside the already mentioned "*flipped classroom*":



- Teaching processes and procedures: the teacher/tutor sets up a working environment that allows the participating students to work in practice on the documents and software packages prepared by the teacher; during the first phase of the session, the teacher/tutor shows the students specific procedures and processes, using functionalities of applications and sharing integrated to the Interactive Classrooms systems; during the second phase, the teacher/tutor proposes to the students real-time exercises in which the students repeat the procedures they have just learnt with the teacher's help; the teacher/tutor intervenes only if the students move away from what is envisaged by the expert model (Kass A., in Garito 1996);
- Collaborative project work: the teacher/tutor prepares an exercise in which the students are asked to handle, in a practical and collaborative way, the theoretical knowledge they have just learnt; the teacher shares with the participating students the working environment that was created carrying on activities including creative and collaborative writing, preparation of technical documents (i.e. : business plans, marketing plans, analyses and reports), team work, cooperative work on specific technical software packages; at the beginning of the session the teacher/tutor presents the exercise and shares the working environment with the students; in addition, the teacher gives the control of the working environment, one by one, to the students who will physically work on the set-up software package following the suggestions resulting from the group discussion; the realized product can be re-used in the following sessions, whereas the final product as well as the single "revisions", collaboratively created in each session, can be evaluated through the tracing system;
- Exam tests simulation: in the last weeks of the course delivery period, when the students will have acquired a suitable skill level, the teacher/tutor organizes a simulated exam test; the teacher/tutor prepares a structured assignment like those that will be worked out for the exam papers; at the beginning of the session, the teacher/tutor submits the paper to all the students who are connected and fix its timing, as that of the actual exam tests. During the exam tests the students can ask for help on specific issues being treated and the teacher/tutor can explain in details how to appropriately deal with the issues or technical problems of the exam tests. At the end of the session, the students submit the completed exam papers through the platform; these will be corrected by the teacher/tutor, assessed by the assessment system and discussed during the following session of Interactive Classroom.

## **2.6 – INTERACTIVE EXERCISES AND LEARNING BY DOING**

In UNINETTUNO's Didactic Cyberspace **Interactive Exercises** are also available, through which the student can assess, in real time, and put in practice the theoretical principles learnt with the videlessons, by implementing a "learning-by-doing" process.

Through virtual laboratories we develop new learning models that will tend to shift human cognitive working from the symbolic/re-constructional mode to that of the motor-perception one. The student can reflect on his own experiences, on the theoretical principles that are made operational and easily stored into memory thanks to his problem-solving activity. An interactive exercise can include different types of questions:

- Open-ended questions  
The student is asked to solve a problem or to answer a question by filling in text box.
- Multiple-choice questions  
The student is asked a question and there are N possible answers of which only one is correct. The student answers by selecting one of the answers.
- Advanced multiple-choice questions  
The student is asked a question and there are N possible answers of which one or more than one are correct. The student answers by selecting one or more answers.

The running of interactive exercises is implemented automatically while displaying the videlessons at the end of each issue treated by the teacher in the videolesson itself. By means of database including all issues semantically related to the videolesson issues, the system generates sets of different questions for each session, making the self-assessment phase always relevant and effective for the student. Interaction is quick and user-friendly and students get a general assessment of the exercise in real time based on parameters that were previously set by the teacher who:

1. Designs each questions and decides which is the correct solution;
2. Set the pass threshold for each exercise (for example, if the exercise includes 3 questions and the pass threshold is 60% the student must successfully complete 2 of them at least)
3. Supply textual feedbacks and hints to review the issue if he passes as well as if he gives wrong answers.

If the exercise is successfully completed the student is led by the system to go on watching the videolesson starting from the following point. On the contrary, in case of wrong answers, the system suggests to the student to go back to the issues of the videlessons that are needed to give a correct solution to the exercise before going on studying more advance study issues.

At the end of the lesson the students and the teachers/tutors, by means of UNINETTUNO's learning analytics system can consult statistical data on their performances in the interactive exercises of the lesson and of the whole course that, through charts and data, give the student a clear vision to self-assess his own progress in learning the subject and to the teacher/tutor an essential tool to orient his contributions in the Interactive Classroom or in the 3D Virtual



Classrooms based on the problems met by the individual students and by the classes as regards specific issues.

#### **4. CONCLUSIONS**

UNINETTUNO's psycho-pedagogic model has soon become a global model acknowledged at international level; many are the agreements that UNINETTUNO reached with Ministries and Universities of various countries of the North and of the South of the World with which we learnt to share curricula and to jointly create, with countries having different political and cultural backgrounds, new educational models meeting the needs produced by the globalized world. Thanks to the new technologies, jointly the interconnected intelligences of the teachers and students build new contents and develop competences and expertise, not based on the imposition of the cultural models of the one or of the other, but on intercultural and inter-linguistic cooperation. UNINETTUNO, thanks to its satellite television network, UNINETTUNOUNIVERSITY.TV (812 Sky channel and 701 RAI channel), which has a very geographic coverage, actually democratized the access to knowledge bring knowledge and learning into the homes of all the citizens across the world. With no more space and time limits all can follow study courses free themselves from the slavery of illiteracy in order to acquire new competences, but also to consolidate a system of shared values. UNINETTUNO actually demonstrated that, in order to build and spread knowledge, thanks to the Internet, borders are uncertain, frontiers are places of continuity and not of conflicts. Thanks to UNINETTUNO's model, teachers and students across the world can give an appropriate answer to the needs of internationalization of the educational systems in order to be able to prepare the skills required by the labor global markets and help transforming the University into an open system, capable of modernizing itself and integrating all the knowledge available on the Web and achieve a worldwide exchange of knowledge.