HANDBOOK

An innovative approach to the usage of the Internet for interdisciplinary learning



AGROweb

School Networks and local products around Europe



HANDBOOK

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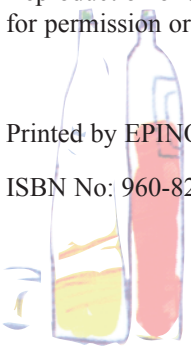
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PREFACE

AgroWeb is an educational project, addressed in the secondary educational level. It was implemented under the framework of SOCRATES Programme, MINERVA Action (Information and Communication Technologies in Education). The Minerva Action seeks to promote European co-operation in the field of **Information and Communication Technology (ICT)** and **Open and Distance Learning (ODL)** in education. The Action has three main objectives, (1) to promote understanding among teachers, learners, decision-makers and the public at large of the implications of MINERVA and ICT for education, as well as the critical and responsible use of ICT for educational purposes; (2) to ensure that pedagogical considerations are given proper weight in the development of ICT and multimedia-based educational products and services; and (3) to promote access to improved methods and educational resources as well as to results and best practices in this field.

This handbook contains three (3) main chapters. The first one deals with theoretical aspects, such as what is ODL and which are its characteristics, how Internet has transformed learning and what the role of the educational software has been in this change, how new subjects in school promote the interdisciplinarity, which tends to be a demand for the school of today, and finally what the new role for teachers in the new era for schools is. The second one deals more specifically with the project AgroWeb describing it, presenting the aims and objectives it had, as well as the mail pedagogical and didactical approaches that dominated its run. It also contains a description of its run when it was applied in the classroom. In the end it presents its innovative points, as well as the general impact it had on the teachers, students and local communities and some impressions the actors had from their participation to the project. The last chapter presents the evaluation strategy of AgroWeb, its main objectives and the results from the data analysis and the qualitative analysis of the project.



CHAPTER I

THEORETICAL FRAMEWORK

1.1 Introduction

This chapter focuses on a range of issues involving the use of Information and Communication Technologies (ICT) in the classroom. More specifically, it:

- outlines the characteristics of open and distance learning systems and their value added,
- describes the ways the internet, web resources and different kinds of educational software can support teaching and learning practice,
- suggests criteria for the evaluation of web resources and educational software
- explains the model of interdisciplinary learning and the emergence of new school subjects which can be added to the existing curriculum and
- comments on the new role, attitudes and competences of teachers





1.2 What is Open and Distance Learning (ODL)?

The term **Open and Distance Learning** involves the way learning occurs and how it is delivered.

Open learning means that learning is not delivered but enabled; the learner is responsible for his/her learning, has control over what, how, where, when and the pace at which he/she learns. He/ she chooses what to learn according to the learning needs and preferences. Individual learning styles also determine the method of learning and the learning path. Barriers such as distance, time and structured, specific design are removed. Provisions are made and flexible, computer-based learning tools are available for the learners to use in order to create and/ or modify their own instruction.

Deeper involvement in the learning activities and eempowerment does not involve only the learner but also the teacher. Teachers feel a great deal of ownership regarding the instruction they create and deliver. Rather than using preconstructed instructional products, teachers use and create a wide variety of materials that support their own instructional objectives.

Some other definitions of Open Learning include the following (Rowntree, 1992):

According to Coffey: "An *open learning* system is one in which the restrictions placed on students are under constant review and removed wherever possible. It incorporates the widest range of teaching strategies, in particular those using independent and individualised learning"

According to MSC: "*Open Learning*: arrangements to enable people to learn at the time, place and pace which satisfies their circumstances and requirements. The emphasis is on opening up opportunities by overcoming barriers that result from geographical isolation, personal or work commitments or conventional course structures which have often prevented people from gaining access to the training they need".

According to Lewis and Spencer: "*Open learning* is a term used to describe courses flexibly designed to meet individual requirements. It is often applied to provision which tries to remove barriers that prevent attendance at more traditional courses, but it also suggests a learner-centred philosophy"

According to Dixon: "... a wide range of learning opportunities that both aim to assist learners in gaining access to knowledge and skills they would otherwise be denied and give learners the optimum degree of control over their own learning".

According to Jack: "*Open learning* is a state of mind rather than a method with particular characteristics"

According to Holt and Bonnici: "*Open learning* is not just about access alone, it is also about providing people with a fair chance of success".

Distance learning takes place when the learner is at a distance from the provider or the learning materials. Educational content and activities are planned and are available for students removed in place and time from their instructors. Computers and telecommunications have opened the way to formats other than pen- and-paper correspondence courses and allow for a more

interactive, integrated learning environment.

A distance learning system can employ methods of open learning to a small or to a great extent. It can be more or less structured, teacher-controlled or learner-controlled, support collaborative learning and/or self-learning.

1.2.1. Characteristics of ODL

The delivery of learning services through Open and Distance Learning (ODL) systems (Trends, 1997) is free from certain limitations that characterise the traditional classroom-based, face-to-face teaching:

- **Geographical:** The primary advantage of ODL is that it allows students to participate in learning situations when issues of distance and scheduling make on-ground learning unrealistic. Students can participate in classes from anywhere in the world provided they have a computer and Internet connection. Also, the online format allows physically challenged students more flexibility to fully participate in class since the Virtual Classroom is delivered to their home through their computers instead of the students having to physically move to the class. Courses, which are provided in distant places, may discourage learners from participating in them, or cause them professional, family and/or personal inconvenience.

- **Schedule of lectures:** Since ODL systems are based on autonomy and self-learning, the learner is not limited by any schedule and the schedule used for learning purposes is defined according to his/ her own pace. In case real-time technologies are used, then specific arrangements may have to be made.

- **Time and rhythm of learning:** Another feature of ODL systems is their flexibility as far as timing (the time spent in a learning task) and rhythm of learning are concerned. Asynchronous communication through online conferencing programs allows learners to fully participate in class discussions at the time, which is most convenient to them. Students can log on to their course at any time of day or night, and have continuous access to lectures, course materials, and class discussions. This is particularly convenient for those who may need to reread a lecture or take more time to reflect on some material before moving on.

- **Learning environment:** In a traditional education system the learning environment is pre-defined, usually by the institution that organises learning. In ODL systems the learning environment is selected by the learner according to his/her preferences. Interaction between the instructor and students and among the students themselves is enhanced. Resources and ideas are shared, and continuous synergy can be generated through the learning process as each individual contributes to the discussions and comments on the work of others.

- **Individual learning needs:** ODL systems often organise content and learning experiences in a modular way, with predefined objectives, so that the learner can choose to take up the modules which correspond to his/her learning needs. This, however, requires a high level of responsibility, discipline and self-control on part of the learner.

- **Access to Resources:** Distinguished guest experts or students from other institutions can be invited in an online class or discussion to share their views and experiences. Students can also access resources and information anywhere in the world. An

online resource section with links to scholarly articles, institutions, and other materials relevant to a range of topics can be provided to students in order to research, extend, or analyse in depth course content material.

- **Reduction of costs:** Another advantage in the exploitation of ODL systems is the reduction of costs, both for the learner and the institution offering learning services, such as the delivery of courses. For the learner, costs are lower because s/he won't have to travel; for the institution costs are lower because theoretically there is no limit in the number of learning taking a course.

1.2.2 Potential Drawbacks of ODL

On the other hand, one should also consider potential drawbacks[1] , such as limited accessibility to technology and operability of systems, which influence the utilisation and effective integration of ICT in teaching and learning practice. Limited access and unreliable technology are critical factors. In addition systems and tools, which are characterised by limited usability often, restrict their use and deter the learner.

Reliance on learner initiative can be a drawback for those who prefer more structure. Although ODL systems support self-learning, one should not forget that the learner enjoys best the autonomy he/ she has when it is combined with support and mentoring. The level of support as well as the level of autonomy one feels comfortable with relies on individual characteristics.

More specifically, the online method of education can be a highly effective alternative medium of education for the mature, self-disciplined student, it is an inappropriate learning environment for more dependent learners. Online asynchronous education gives students control over their learning experience, and allows for flexibility of study schedules for non traditional students; however, this places a greater responsibility on the student. In order to successfully participate in an online program, student must be well organized, self-motivated, and possess a high degree of time management skills in order to keep up with the pace of the course. For these reasons, online education is not appropriate for younger students (i.e. elementary or secondary school age), and other students who are dependent learners and have difficulty assuming responsibilities required by the online paradigm.

Technical skills in computer operation and Internet navigation, as well as the ability to cope with technical difficulties, are critical factors too. For example, learners are expected to be able to use a variety of search engines and be comfortable navigating on the World Wide Web, as well as be familiar with Newsgroups, FTP procedures and email.

Lack of essential online qualities on behalf of the instructor is important. If instructors are not properly trained in online delivery and methodologies, success will be compromised. Communication skills are essential and the instructor must be able to compensate for lack of physical presence by creating a supportive environment in the Virtual Classroom where all students feel comfortable participating and especially where students know that their instructor is accessible. Failure to do this can alienate the class both from each other and from the instructor. However, even if a virtual professor is competent enough to create a comfortable virtual environment in which the class can operate, still the lack of physical presence at an institution can be a limitation for an online program.

[1] *http://www.ion.illinois.edu/IONresources/onlineLearning/weakness.html*

It is important to recognize that some subjects should not be taught online because the electronic medium in its current state of development does not permit the best method on instruction. Physical movement and practice contribute to the achievement of the learning objectives. Some subjects are probably best taught in a face-to-face traditional learning environment rather than offer a simulation of a physical learning experience.

Finally it should be noted that curriculum and teaching methodology that are successful in on-ground instruction will not always translate to a successful online program where learning and instructional paradigms are quite different. Online curriculum must reflect the use of dialog among students (in the form of written communication), and group interaction and participation. Traditional classroom lectures have no place in a successful online program. Education of the highest quality can and will occur in an online program provided that the curriculum has been developed or converted to meet the needs of the online medium.

1.3. Internet in school, the educational software

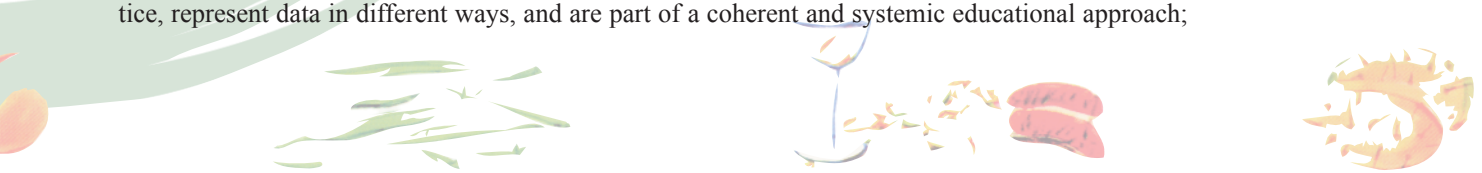
1.3.1 Rationale

Advocates of the use of ICTs in the classroom claim that universal access to the Internet will:

- help end the isolation of teachers;
- expand the resources for teaching and learning in schools and classrooms;
- provide more challenging, authentic and higher-order learning experiences for students;
- and make schools and teachers more accountable to parents and communities.

(Bransford, Brown, and Cocking 1999) quoted in (McCombs 2000) suggest that technology can support learning in five ways (p. 195):

- bring exciting curricula into the classroom that is based on real-world problems and that involves students in finding their own problems, testing ideas, receiving feedback, and working collaboratively with other students or practitioners beyond the school classroom;
- provide tools and scaffolds that enhance learning, support thinking and problem solving, model activities and guide practice, represent data in different ways, and are part of a coherent and systemic educational approach;



- give students and teachers more opportunities for feedback, reflection, and revision, including those where students evaluate the quality of their own thinking and products, have opportunities to interact with working scientists, receive feedback from multiple sources which include their peers, and experience cognitive tutors and coaching in areas where improvement is needed;
- build local and global communities that are inclusive of teachers, administrators, parents, students, practicing scientists, and other interested community people, expanding the learning environment beyond the school walls; and
- expand opportunities for teacher learning that include helping teachers to think differently about learners and learning, to reduce the barriers between students and teachers as learners, to create new partnerships among students and parents, and to expand communities of learners that support ongoing communication and professional development of teachers.

One of the most quoted reasons why ICT should be integrated into teaching is that ICT contributes to quality teaching and learning. One aspiration is the more effective achievement of existing educational goals. Another aspiration is that ICT should act to liberate learners. The central issue (Somekh et al eds, 1997 p14) is empowerment, pupil's degree and autonomy over the pace and content of his/her own learning.

Choosing to use ICTs in the classroom demands changes in the way the instruction is organised. Teachers' attitudinal changes concerning classroom practice play a fundamental role in realising the potential of ICTs in education. The shift from the old paradigm to the new (information-age) paradigm is best illustrated below (Riel & Fulton 1998):

Isolated class structure	Learning community
Homogeneous Groupings	Heterogeneous Grouping
Class Discipline	Community Organisation
Competition	Collaboration
Knowledge Delivery	Knowledge Instruction
Teacher Centred	Student Centred
Independent, individual work	Interdependent, teamwork
Expertise flows from 1-to-many	Expertise flows in many directions

The paradigm shift is from a teaching environment to a learning environment, where appropriate combinations of challenge and guidance, empowerment and support, self-direction and structure exist.

1.3.2 Learning Scenarios [2]

- **First ODL scenario: the virtual classroom**

For a start, the methodology of the virtual classroom can be, depending on the mode of instruction, a simple reproduction of the classroom model, i.e. a trainer-centred process, or a more learner-centred process.

Learners attend individually or in groups in one or more rooms equipped with all the necessary infrastructures for audio/video-conference classes, situated in learning centres. These audio/video-conferences are lectured by instructors/experts at appointed time, previously arranged, aim at delivering the core content of the course, the essential teaching content. The optional learning material, such as complementary information, drills, practice, and self-assessment tasks, can be accessed through off-line technologies (drill and practice software, CD-ROM, video, etc.) and on-line technologies (BBS, FTP, E-mail, etc.). The content organisation may be modular, and it is decided only by the instructors. Learners participate by asking questions and commenting on the issues raised.

In general, organising a virtual classroom is appropriate for the distribution of knowledge among a large number of people, updating knowledge, increasing and diversifying the feedback given to trainees, accessing information in a shorter period of time, encouraging confident and continuing personal and professional use of ICT etc.

- **Second ODL scenario: supported self-learning**

Unlike the virtual classroom, the methodology of supported self-learning is learner-centred i.e. the learner is responsible for his/her progress and develops and refines learner and problem-solving strategies. In this case learning is initiated and directed by the learner and can include self-paced, independent, and individualized learning as well as self-instruction.

This methodology has a higher degree of flexibility as the learner chooses the time, the place and the pace of learning. The learner, working at a computer at a convenient time and pace, is able to search and utilize the vast resources of the Internet. He/she can visit libraries, museums and various institutes world-wide, talk to professionals, access recent research, and read newspapers and peer reviewed scholarly journals online. Learners can write collaboratively with peers and even publish written and multimedia products on web pages.

On the other hand, the tutor models, mediates and explains, redirects focus and provides options. He/she coaches learners and in general supports them through the learning process by providing feedback, self-learning material and an evaluation system. It should be noted that the materials used for self-learning should allow independent study and well prepared, motivating and properly structured in the following: objectives, content, tasks and self-evaluation exercises, answer keys and motivating and facilitating learning elements.

[2] *Trends Project (1997) Deliverable 4.1: Training Model.*

The main goals of this methodology are to encourage the learner to learn autonomously, according to one's own interests, needs, pace, etc., to individualise learning paths and pace, to update the course content knowledge and to allow greater interaction between tutors and learners as it is a trainee-centred scenario and to encourage confident and continuing personal and professional use of ICT.

- **Third ODL scenario: collaborative learning**

The use and application of ICT to the learning process allows the realisation of collaborative learning. Technology is used as a tool for learning, group work, communication and collaboration.

The new technologies have made a horizontal communication flow possible. Learners are able to exchange information and experiences in real or not real time, as well as to carry out common project work for both learning and operational purposes. More specifically, collaborative learning is the process of getting two or more students to work together to learn. Learners collaborate with each other and participate in heterogeneous groups, which include a mix of cultures, abilities, socio-economic status and age, a wealth of knowledge and perspectives. Learners with different perspectives are brought together to produce shared understandings. Truly collaborative environments encourage all students to ask questions; define problems; take charge of the conversation when appropriate; participate in setting goals, standards, benchmarks, and assessments; communicate with experts outside the community. Each learner has a specific role and task but all learners collaborate to accomplish a joint goal or project. Learning occurs as the result of interaction with others.

Considering the issues previously described, the objectives of the collaborative learning scenario may be stated as follows:

- To learn collaboratively and autonomously, according to group's own interests, needs, pace, etc.
- To share information and experiences
- To reinforce the processes of knowledge construction by means of interaction with peers and ,thus, its metacognitive, cognitive and social components
- To update the course content and knowledge
- To increase and diversify the feedback given to trainees (thanks to vertical and horizontal communication)
- To access diversified information and different opinions
- To allow greater interaction between trainers and trainees
- To encourage confident and continuing personal and professional use of ICT

Choosing which learning methodology to employ depends on the learning objectives, the specific characteristics and the needs of the learners and on other factors related to technology and time. However, it should be noted that the aforementioned learning methodologies complement one the other and can be integrated. In this way any limitations of one method can be overcome

by the other.

1.3.3 Educational Software

According to **TEEM** (TEEM: Teachers Evaluating Educational Multimedia, http://www.teem.org.uk), educational multimedia can be classified into the following categories:

- **Content rich sources**

For example, subject-specific packages, atlases, dictionaries, reference sources, newspapers, stories/plays and poems.

- **Courseware**

This might be a program introducing number and early reading skills to young children, or subject specific skills, such as an understanding of principles of biology for older students

- **Tools**

These include generic tools, such as a word processor or subject specific materials, such as a music composition program.

- **Assessment Software**

This might include programs that are related to knowledge appropriate for tests (e.g. SATs or GCSE).

Another classification of educational software involves the distinction between **generic software and subject-specific software.**

Generic software consists of programs such as word processors, desktop publishing packages, spreadsheets, databases, hypermedia and drawing and painting programs. Generic software is designed to be used as a tool. As such, it can support learning in all curriculum subjects and at the same time support IT capability. Generic software, unlike subject software, is content free and so is far less likely to be prone to gender; race, age, class or ability bias.

Subject-specific software consists of programs, which support the learning of particular skills or concepts associated with a subject. It is designed to support the learning of one subject and offers little in terms of IT capability.

When using generic software, learners can generate content from their own perspective. They can use word processors to write their own poetry and draft and redraft essays, DTP packages to publish their own pupil newspaper, spreadsheets to calculate the profit they might make on their school fete, or databases to store and analyse information they have collected for a research project.

This is in contrast to subject-specific software, which may represent someone else's perspective, a culture which is not one which pupils are familiar with, or a view of teaching which is not shared by teachers using the software.

Using generic software gives both pupils and teachers more control over the level of difficulty in a program. For example, hypermedia software can enable the creation of spoken, pictorial or written presentation of a piece of work at any level. Word processors do not define the amount of text to be created and spreadsheets do not define the level of difficulty of the maths engaged in: this can be controlled by the teacher and the pupil.

Subject-specific software, on the other hand, has preset levels of difficulty and while these may appear flexible to begin with, its limitations soon become obvious with a mixed-ability class. As teachers' confidence and competence with IT grows, they will want to have more control over the design and content of the software.

Use of generic software can support both subject capability and IT capability. In geography for example, emphasis is placed on the process of inquiry and development of an awareness of areas beyond the locality IT can support the inquiry process in a number of ways: databases can be used to help to organise, store, sort and analyse locally collected data; desktop publishing and word processors can be used to help present the results of findings. In modern foreign languages, emphasis is placed on speaking, listening and writing. Hypermedia can be used by pupils to practice speaking and listening and to write and present their work. In science, spreadsheets can help to record and analyse the results of investigations and support investigation and analysis.

Generic software is also common to many subjects. Teachers may use the same software - spreadsheets, for example - in geography, science and maths. Using a common toolbox of generic software, pupils' confidence and competence can be applied across the curriculum and enable them to concentrate on learning rather than the technicalities of using different packages in each subject. In doing so, of course, their IT capability develops accordingly.

Finally, educational software can also be characterised **according to the level of structure** it has and thus ranges from highly structured programmes to less structured software.

Some computer programs can be described as **more structured** than others with respect to the number and variety of responses they allow children to make. Software in which acceptable responses to choices are already pre-programmed requires children to match responses in the computer's memory rather than to create their own. Brief descriptions of some "highly structured" programs are given below:

- *Computer Games*

Computer games are among the most popular software for children. Most of these games are highly structured, although some of the newer ones invite children to make more choices than earlier versions.

- *Drill and Practice*

Drill and practice software gives children practice in doing arithmetic problems or developing pre-reading skills, reinforcing what children have already learned. One advantage of these programs is that the better ones give immediate feedback or move

the child to an easier or more challenging drill according to the child's previous answers.

Good drill and practice programs take advantage of the special capabilities of the computer (animation, chance to try again, choice options, and so on) to enhance content presentation and encourage the child to interact with the computer. On the other hand, it can be argued that drill and practice exercises are widely available in workbooks and that programs, which make more imaginative use of the computer's capabilities are preferable.

- *Tutorials*

Tutorials are educational programs designed to present topical information to children who already read. Children can frequently go through tutorials by themselves as long as the program instructions are clear. Content questions and self-tests help to sustain interest in the subject being presented.

Less structured software encourages self-expression or invites a child to give creative responses to questions is characterized by few preset responses; children may be asked to use computer "tools" such as a word processing program, pre-programmed musical tones, or a colour palette to create their own stories, composition, designs.

1.3.4 Criteria for evaluation

When choosing to use educational software and material found on the web, the need to establish certain criteria for evaluation emerges.

Several lists with criteria for evaluation have been developed. There is no checklist that seems to be exhaustive but the following criteria are frequently quoted.

- **Usability**

Usability of multimedia material and WWW resources (Oliver et.al 1996) is a lot different from usability of conventional materials. Conventional materials require few operational skills on the part of the learner, while WWW materials, for instance, employ many different functions and features whose effectiveness and/ or ineffectiveness is subject to evaluation. Usability can be measured in terms of access and retrieval speed, navigation, search facility, communication facility, user friendliness.

Educational software web resources should be examined in order to (1) see the extent to which they can be easily and/ or reliably accessed or if they are frequently overloaded or offline and (2) identify technical constraints- if any, which may limit usability.

In addition, the effectiveness of several facilities that influence usability should be considered. Such facilities include (a) the navigation tools, like menus, buttons, history lists, site maps and/ or table of contents that should be both sufficient and easy to use, (b) the search tools, either in the form of a search engine or search categories, which help or hinder the user from effectively retrieving information in whatever form and (c) the communication tools that enable the user to get help, to communicate with peers and to interact with the web resource itself through games and tests. All these elements are said to enhance the

resource's usability and increase its pedagogical value-added and user- friendliness.

- **Pedagogical Effectiveness**

In addition to usability, pedagogical effectiveness in terms of: pedagogical approach, interactivity, interdisciplinarity, learning outcomes should be examined.

General pedagogical criteria are related to the objectives and the target audience. According to (Smith 1997), it is important that a resource states the subject area and the level of users it is addressed to and takes into account the intended users' background and knowledge, goals and motivation for using the particular resource. In this way the resource (Edelson & Gordin 1996), which is available to the user, becomes also accessible.

Apart from the general pedagogical criteria, the evaluation should focus on exploring the role of the learner and the role of the teacher within the resource separately.

As for the role of the learner, students using the resource are expected to create knowledge databases (i.e. act as creators, constructors), carry out tasks and activities (i.e. act as doers) and undertake research and field studies (i.e. act as explorers / researchers). The quality of the instructional setting of the resource was therefore assessed. According to (Oliver et.al. 1996), the role of the learner within an instructional setting greatly influences or enhances learning outcomes. If a resource acts like another information source and interacts to a limited extent with the user, then it contributes little to the user's learning.

In addition, the extent to which the resource includes or reinforces collaborative activities, which are said to be of great educational value for the students involved, should be measured. As (Oliver at al. 1996) point out, interactions and activities that enable group and teamwork should be included in the teaching-learning process. They are its essential ingredients. The communications component of the WWW provides unique opportunities to enable forms of communicative and collaborative activities among networked learners. The value of group work cannot be stressed enough. Group work (Riel 1998) provides a context for the externalization of thinking. It allows for the discussion of multiple perspectives and helps all participants realise that each person creates one of many perspectives on a topic or problem. Learning to see from the perspective of others helps create a more complex understanding of situations. More effective learning environments ensure that the resources are used within a social context with students working in groups, discussing the issues, reporting back, presenting findings, interviewing and debating the issues to ensure that students have the opportunity to articulate, negotiate and defend their knowledge. Knowledge construction is rarely done in isolation.

Measures and assessments of achievement and outcomes from instructional settings also play an important part in the teaching and learning process. It is suggested (Oliver et.al. 1996) that assessment should not be a separate stage in a linear process of pre-test, instruction, post-test; rather assessment should be integrated, ongoing and seamless part of the learning environment. The enhanced interactive capabilities of the WWW provide the means for assessment of student learning to extend beyond conventional essays and examinations. More reliable assessments now take the form of evaluation measures such as portfolios, summary statistics of learners' paths through instructional material, diagnosis, and reflection and self-assessment.

Regarding the role of the teacher, it should be examined in order to see if the resource provides teachers with tools to develop

own material, e.g. lesson plans, classroom activities, tests, etc. and if they can make good use of the existing material offered by the resource.

In addition to that, opportunities for communication with colleagues should be evaluated. It should be noted that a programme or a web-resource, which enables and supports communication greatly facilitates the development of a learning community (Riel 1998). This learning community is a community of practice, a group of people who share common interest in a topic or area, a particular way of talking about their phenomena, tools and sense-making approaches for building their collaborative knowledge with a sense of common collective tasks. Communications technology (ibid) provides promising opportunities for collaborative learning environments for teachers in which they can reflect on practice with colleagues, share expertise in a distributed knowledge framework, and build a common understanding of new instructional approaches, standards and curriculum.

Communication with students is also important. The teacher should be able to provide coaching and feedback scaffolding and fading, modelling and so on, which are powerful enhancements to any learning situation.

Furthermore interactivity is very important. Interactivity (Oliver et.al. 1996) involves the forms of communication that a medium supports enabling dialogue between the learner and the instructor - not one-way transmission mode- and it is an important attribute of technology-supported environments. Print-based instructional materials have served well in the past in support of student-centred independent learning. In recent times, the move to computer-based learning environments has been taken to improve the perceived interactivity of the materials.

However, it should be noted that clicking on paths and navigating through a WWW instructional sequence is not representative of interactivity. Some strategies that have been used to create the essence of interactivity in WWW learning materials include the provision of model answers and e-mail communications. Other forms of interactivity include the creation of forms within documents by which learners can enter responses and receive programmed feedback.

Integration of WWW resources (Riel 1998) should provide new forms of interaction very different from reading a text, or watching a video or talking to a group. It should be an evolving social construction. It is this blend of projected reality with communication that makes it possible to create a sense of shared place with the potential for different forms of social exchanges.

Finally, interdisciplinarity influences a resource's pedagogical effectiveness. In other words, it should be examined the extent to which a resource provides information in different subject areas, integrates it efficiently by making meaningful links, includes activities which draw on knowledge and skills from various subject areas and gives support for the development of interdisciplinary projects.

- **Content efficiency**

The evaluation of content efficiency includes measuring information, structure, presentation and accuracy.

For a start, information quality is an important criterion. More specifically, the breadth and depth of information, questions such as whether information is linked with other relevant on-line resources, if it is detailed and extensive, if it enriches the school curriculum and if various points of view are presented are relevant.

Information should also be evaluated in relation to the educational objectives it serves and in terms of its appropriateness for the specified target audience.

In addition, the reliability of information has to be examined. Information (Smith 1997) can be factual, original, opinion or simply links; it can have the form of a print document or it may be published on the WWW; whichever the case is, there should be evidence of authenticity and reliability, a reference of the authority responsible. Clues that provide such evidence are the credentials of the author or source of information. In addition meta-information i.e. information about information can facilitate the reliability check. (Harris 1997) comments that there are two basic forms of meta-information, summary and evaluative meta-information. The first includes all the shortened forms of information, such as abstracts, content summaries or even tables of contents. The latter includes all the types that provide some judgment or analysis of content, i.e. recommendations, ratings, reviews and commentaries. These two types can be combined, providing us with a quick overview and some evaluation of the value.

It is also important to know when the information was created and the date of the last update of the information included in a web-resource in order to check if it is still of value. Some work may be timeless; other work, however, has limited useful life because of advances in the discipline (psychological theory for example), or it is outdated very quickly (like technology news).

Apart from the quality of information, evaluation should focus on the structure of the resource. Assuming that a resource contains rich material and links with other on-line resources (Edelson & Gordin 1996), these have to be properly organized in order to help the user locate the information it is of his/ her interest. Organization (Oliver et.al. 1996) of material in web resources can either be linear, i.e. links simply act to connect nodes in a specified sequence and the learner follows an instructional sequence planned by the instructor. There is also the potential to create materials with varying degrees of linearity. Links may have a hierarchical structure, giving learners more freedom in the choice of path through the materials. The choice of information organization for materials in the WWW depends on the nature of the intended learning outcomes. For example if the aim is to develop students' initial knowledge, namely facts, procedures and rules of discourse, linear linking is an appropriate hypermedia form. For higher levels of knowledge, developing an understanding of concepts and principles, the less structured hierarchical and referential linking is more appropriate. In such cases students are guided by such factors as their prior knowledge and readiness to assimilate new material. When building on an existing knowledge base, learners can benefit from the freedom to browse and explore, to inquire and seek responses to their own questions rather than following a pre-determined path of instruction.

Another critical aspect that determines content efficiency is the quality of presentation/ design of the resource. The legibility of the texts and the technical and aesthetic quality of graphics, images, sound, video, and virtual reality elements are indicators of good presentation; according to (Oliver et al. 1996), these also increase the "readability" of the material presented and facilitate understanding.

Finally, content efficiency can be measured in terms of accuracy. The goal of the accuracy test (Harris 1997; Smith 1997) is to assure that the information included in a resource is actually correct: up to date, factual, detailed, exact and comprehensive and it is free of political, ideological biases.

1.4 Interdisciplinarity & new subjects in school (e-commerce)

Recent calls for educational reform focus on the need for curricula emphasizing conceptual learning that is integrated across traditional subject areas. Interdisciplinary instruction links various content areas and is organized around questions, themes, problems, or projects rather than along traditional subject-matter boundaries. Such instruction is said to be responsive to children's curiosity and questions about real life and to result in productive learning and positive attitudes toward school and teachers.

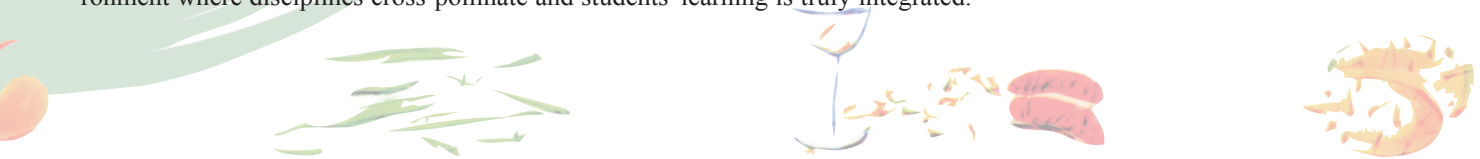
Classroom strategies for learning become more student-centred, with learning of content increasingly embedded in real-world contexts, separation between academic curriculum areas becomes less defined. Problem-oriented learning that is connected to real-world problems draws from many disciplines to find solutions. When a powerful idea or relevant problem is presented in a learning context, students are motivated to collaborate, explore the idea, and find solutions. In their quest, it becomes apparent that:

- Communications skills are necessary.
- Historical perspective may provide clues to the exploration or solutions.
- Mathematical principles and skills can help in measuring, graphing, calculating, and analyzing the problem.
- Technology tools can assist in researching the problem, collecting and organizing information, and presenting results.

Learning through such interdisciplinary, student-directed learning activities has proved effective and long lasting. New learning environments must provide students with experiences in which they draw upon knowledge from several disciplines, apply a variety of strategies to get at the intended learning, and choose from a rich array of learning tools to examine, publish, illustrate, and communicate their results.

Perhaps our greatest challenge in applying multidisciplinary learning exists at the secondary grade levels. Many high schools have yet to adjust their schedules, strategies, or educational philosophies to accommodate the need to connect learning to real-world contexts and problems.

Information technology cuts across all disciplines. It is a powerful aid to addressing real-world multidisciplinary problems. The ability to access and store digitized information allows the student to research, collect, and share on a level hitherto unparalleled. Collaboration and consultation with other students and experts is fast becoming an everyday experience. Increasingly powerful computers provide students with real-world problem-solving tools. They help students overcome handicaps, choose among learning strategies, perceive and create new relationships among subjects, and demonstrate their knowledge in words, pictures, moving images, and sound. The experience of these changes allows us to preconceive the high school learning environment where disciplines cross-pollinate and students' learning is truly integrated.



Educational experiences are more authentic and of greater value to students when the curricula reflect real life, which is multi-faceted--rather than being compartmentalized into different subject areas. AgroWeb activities involve students in basic commercial transactions over the Internet through which they become aware of the capabilities and certain forms of e-commerce, realise everyday problems, the way the common market operates and the changes introduced by the use of Euro.

In fact interdisciplinary learning is at the heart of AgroWeb project. Its activities help students construct meaning through creative problem solving and decision making processes. Students familiarise themselves with the perspectives, knowledge, data-gathering skills and methods of inquiry of all the disciplines (i.e. language, culture, history, geography, mathematics and economics), interact with others in a learning community where diversity of thought and culture is valued and they construct knowledge.

AgroWeb is, however, more than a project; it is a learning community in which students and teachers determine together the issues, questions, and strategies for investigation and where there is a balance between student-initiated and teacher-initiated learning experiences. Students have the opportunity to develop both independence as "entrepreneurs" and the ability to collaborate with each other and with teachers to raise questions, investigate issues, and solve problems. A variety of opportunities for interaction among diverse learners, who differ in abilities, perspectives, experiences, ethnicity is provided.

AgroWeb draws from the knowledge and processes of multiple disciplines and encourages students to become active learners equipped with the analytical, interpretative, and evaluative skills needed to solve real-life problems. It eliminates artificial barriers among subject areas, gives students a broader context for solving real-life problems and inspires teachers to develop innovative teaching practices beyond stereotypes.

1.5 New role for the teachers

When talking about the use of ICT in the classroom, one should consider the specific conditions that can act as constraints in the diffusion and successful implementation of such an innovation. These conditions are related to the existing curriculum, managerial issues, range of resources available, level of competency and attitude of the teacher.

In fact, the teacher is a key player in the implementation of the innovation. At the centre of effective use of instructional technology is the teacher. For students to become comfortable and effective users of various technologies, teachers must be able to make wise, informed decisions about technology. All teachers should be confident in applying technology when and where appropriate.

Fullan quoted in (McCombs 2000) stresses that the more powerful technology becomes, the more indispensable good teachers are. In Fullan's view, teachers are needed who are pedagogical design experts and facilitators of learning. Technology may

change some of the traditional teacher roles, but it will also require them to engage in more powerful roles - roles that include not only using technology appropriately that it opens new pathways to learning not previously available, but also require teachers to find ways to build in meaning, purpose, connections and relationships to the larger world and community outside the school building.

The role of the teacher in the new technology-rich instructional paradigm involves the following:

- becoming the creator of an effective external learning environment that stimulates the environment within.
- mentoring and counseling to ensure that learners are encouraged to pursue their learning in an appropriate and meaningful direction using approaches best suited to them as individuals (Fox 1997)
- facilitating students' inquiry, guiding student work and offering individual help (Suthers 1997 et al)
- coaching, observing students, offering hints and reminders, providing feedback, scaffolding and fading, modeling, (Oliver, Herrington & Arshad 1996).

However, there are a number of teacher-related factors that should be carefully considered so that appropriate support and professional development opportunities are provided. These teacher-related factors that can act as barriers include the following:

- Established patterns and limited exposure to new models

According to (Collis 1996) teachers may have developed patterns and styles of teaching and students interaction that fit their own circumstances and can be managed. Previous practice provides them security. Many prefer replicating traditional chalk and talk instruction and "safe", teacher-led and controlled learning activities. Changing what they think as appropriate pedagogy and for the learners, themselves and their subject area may be difficult. This can be even harder when teachers act in isolation from one another and are not exposed to innovative models of learning.

- Accessing technology (ibid) for lesson preparation but also for instructional purposes plays a significant role. The availability and operability of technologies influences the extent to which they are used.
- Teachers' workload (ibid) and lack of flexibility in time and in the curriculum are also considerable constraints.
- The school's climate or else the school's culture.

Drawing from various interpretations, (Stoll & Fink 1996) define school culture as follows; various formal and informal elements, the beliefs that colleagues share, the dominant values and the school vision, as well as the organisational rules and policies that regulate the life of the school. We should not forget that the teacher is part of a whole, is member of an organisation with which he/ she interacts. If a teacher works in isolation from peers, without collegial support and in a stagnant environment, he/ she is likely to be influenced by it and remain static. On the other hand, an organisational culture that is characterised by teacher collegiality and formal or informal collaborative work, both supports and facilitates the development of the organisation's members. Teachers working in an environment where they feel safe, give and receive support from their peers and/ or

from the head, exchange ideas and innovative practices and share the same values, are likely to respond positively to an innovation and embrace it.

What teachers need, in order to respond to their new role are skills in ICT, which can be classified into a range of competences. These competences act a useful framework for teacher professional development and should be perceived as integrated elements of a teacher's professional role and activities. The National Council of Educational Technology's guide (NCET, 1995) lists seven elements:

- positive attitudes to ICT
- understanding of the educational potential of ICT
- ability to use ICT effectively in the curriculum
- ability to manage ICT use in the classroom
- ability to evaluate ICT use
- ability to ensure differentiation and progression
- technical capability to use an appropriate range of ICT resources and to update these skills

In order to develop these skills and overcome the barriers mentioned above, teachers need:

- Sufficient professional development opportunities in order to (1) learn how technology works and how it is integrated into the curriculum, (2) develop new skills and (3) change attitudes.
- Support both on pedagogical and on technological issues in order to sustain the use of new technologies in the instruction and to help teachers respond to the demands of their new multifaceted role.

However, changing roles and adopting a new model of instruction which involves the use of ICT is a lengthy process. Teachers go through certain phases before they fully adopt and commit themselves to using ICTs for instructional purposes.

(Riel & Fulton 1998) adopt the stages that describe teacher change in relation to technology intensive environments or projects identified by ACOT[3] researchers namely the entry level, the adoption level, the adaptation level and the appropriation level.

- Entry level: much frustration and anxiety, with a focus on replicating traditional instruction and learning activities
- Adoption level: beginning to move from concern with connecting the computers to using them, but with much of the attention on how they can support established instructional formats and teacher presented lectures and presentations
- Adaptation level: greater focus on ways student involvement may change, and teaching style may differ (e.g., giving stu-

[3] *ACOT: Apple Classrooms of Tomorrow research project.*

dents more responsibility, encouraging students to use and create activity modules similar to those the teachers are creating)

- Appropriation level: new instructional patterns start to emerge building around interdisciplinary project based approaches, more reflection on teaching and recognizing the need for alternate models of assessment and classroom structuring.

Only when teachers adopt innovation, commit themselves to using technology for instructional purposes, can we ensure that students will be prepared for the challenges they will face in the future. Simply providing sufficient access to technology for teaching and learning is not enough. The preparation of new teachers should be improved, including their knowledge of how to use technology for effective teaching and learning; the quantity, quality and coherence of technology-focused activities aimed at the professional development of teachers should be increased; and the instructional support available to teachers who use technology should be improved.



CHAPTER II

THE AGROWEB PROJECT

2.1 Introduction

AgroWeb project was developed[4] under the Socrates Programme (MINERVA Action- Information and Communication Technologies in Education). The duration of the project was two (2) years (September 2000-August 2002). A network of fifteen (15) European secondary schools coming from six European countries were involved in the project. The overall number of students having participated in the project during the two years of the project's run is estimated to about 450 students. This network was coordinated by Ellinogermaniki Agogi Research and Development Department (Athens, Greece). The Lambrakis Research Foundation (Greece), experts in the field of educational Technology participated in the project, while the scientific groups of two University Departments of Pedagogical Psychology (University of Frankfurt am Main-Germany and Universite de Picardie Jules Verne-France) were charged with the evaluation of the impact of the adapted didactical approach, following up the activities and results of the project. Finally University Professors from the Athens University of Economics and Business, (Greece) and Universite Paris Sud-Orsay, experts in the fields of e-commerce and the development of educational multimedia were used as consultants for specific needs of the project's run. The project's activities in school classes took place in two successive cycles of school-centered work. The first cycle, the test run, lasted from January to the end of May 2001 and the second cycle of school centered work, the final run, lasted from September 2001 to the end of the school year, May 2002. The highlight of the activities in the framework of the project was the organization of the major closing event that took place in Athens

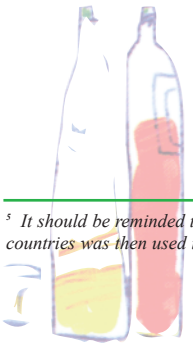
[4] *AgroWeb project was supported and co-financed by the European Commission in the framework of the Socrates Programme, Minerva Action.*

on the 20th of April 2002 with the participation of representatives of all participants and many visitors.

2.2 Project's description

The AgroWeb project aimed to create an integrated framework for activities that have the potential to provide real world results through an interdisciplinary model easily applicable in the current educational practice. This was achieved by providing a model of motivating activities, integrated in the classroom, a model that developed an innovative learning environment based on the creation of a virtual classroom, where every possible aspect of a conventional classroom was simulated. Agroweb project adopted an interactive and collaborative form of ODL's application with decentralised organisational form.

In the framework of the project a network of European Secondary Schools, Educational Institutes of Pedagogical Psychology together with specialists in the field of development of educational Multi-Media developed a web-enabled application platform, the e-shop, through which students of 15-18 years old promoted agricultural products of their areas. The AgroWeb project, making full use of the capabilities the web offers in order to stimulate students' interaction, created a web-based e-shop platform, in the design of which proper weight was given on its educational concept. This platform was a tool for students, a distributed learning environment, facilitating the learning process. It included facilities to produce graphical representations of the sales of a product (product's performance), to compare actual and anticipated performances and in general what was necessary to monitor the financial activities of a real shop. The AgroWeb e-shop was the electronic AGORA, the "electronic open market" where during the project's run, in addition to the commercial transactions, the person to person contact was taking place and where the students had the chance to realize in praxis the importance of the European single market and the common European currency, the EURO[5]. The reality of modern economy practices was thus transferred into the classroom. It is believed that students' world state friendship can be busted only if based on a person- to-person contact. This has been proved that it can best be achieved when people from different nations work together with common aims and objectives, as the students participating at the AgroWeb project did.



[5] *It should be reminded that in the beginning of the project (September 2000) the common European currency, the Euro, had not yet been introduced in Greece and in several other countries was then used in parallel with the national currency.*

2.3 Aims and objectives

The AgroWeb project targeted the meaningful application of ICT in an interdisciplinary approach of the learning process. The application of the interdisciplinary approach was not only meant as the connection of learning processes of various disciplines as geography, mathematics, new technologies, economics etc. in the common framework of one project. Agro Web's methodology was planned in such a way as to also connect non technical activities as the planning and implementation of a marketing and distribution policy safeguarding sustainability of agricultural products making use of ICT tools, thus creating bridges between tradition and new technologies in modern life.

More specific the objectives of AgroWeb project were:

- **The development of an interdisciplinary model in current educational practice.** It is held by the participants of the project, that interdisciplinarity is crucial towards enhancing the effectiveness of education, since it provides a unique way of strengthening learning processes, such as discovering analogies, similarities etc., while providing topics, which are inherently closer to real world problems. Educational context of AgroWeb was not transmitted in a theoretical way but rather in a biomatic way in the form of a real life experience. Students became entrepreneurs finding, promoting, marketing and selling agricultural products from their local areas. During all stages of this procedure the students acquired knowledge and skills on subjects such as language and culture, history, geography, mathematics and economics. This interdisciplinary "real-world" educational concept was materialized with the specially developed electronic shop **(e-shop)**. The e-shop was the **electronic AGORA**, the meeting point of all transactions and exchanges of ideas, the place where the European single market and the importance of the European single currency, the **EURO** was realized in praxis. In this way students were not only educated in the economy and marketing practices but also realized the fundamental changes taking place in the European common market with the introduction of the common currency.

- **The provision of a model for motivating and integrated activities in the classroom**. The AgroWeb project placed a heavy emphasis on proposing an integrated framework for activities that have the potential to provide real world results. It is common knowledge among educators that such activities have a unique potential for providing motivating topics in the classroom and enhancing the quality and the effectiveness of education. Students learn better when they participate in the learning procedure actively and in order to convince them to do so, one has to create the appropriate environment, select really interesting activities and topics of research. In the framework of the AgroWeb project students were asked to collect appropriate and "marketable" content on the products they were going to sell electronically, in order to present them on the Web. The "marketability" of the content was an especially innovative point since it provided a very motivating aspect in the whole procedure.

- **The provision of a model for the usage of ICT in schools**. For AgroWeb the construction of a web page, or the contribution of some e-mails in an electronic bulletin board was not a target in itself. On the contrary, students and teachers had to be trained in discovering the "real world" implications of the Internet and planning the design of their tools accordingly. During the project's implementation students of the participating schools used the capabilities that Internet offers to promote

the traditional agricultural products of their areas, to commercialize them on the web following a business and media coverage plan. The developed e-shop was not only used as a distribution centre of goods but also as an educational tool providing facilities of monitoring the performance of each product in the market in a graphical way. The e-tool of the e-shop gave the possibility to students and whoever else interested to view the sales of a specific product during the month, to see the distribution of these sales in the different countries-consumers, to compare the sales in different countries as well as the estimated sales -according to the business plan made by each school about each product to be promoted- versus the actual ones. It should be stressed though that the whole set-up as such provided strong incentives for actual tele-working, not merely for the provision of content over distance. The selection of roles in the whole process brought the best out of students' skills and served as initiation to vocational training according to contemporary demands.

- ***The familiarization of teachers with ICT and ODL***. The project aimed to provide teachers with an effective training that would accustom them with the use of modern ICT and allow for the incorporation of ODL elements in their teaching practice. The coordinating Institution with the support of Lambrakis Research Foundation and a team of experts in the Athens University of Economics and Business (Athens, Greece) organized training seminars addressing the issue of ODL application in secondary level education. Emphasis was given to motivation problems, ability to handle ICT and evaluation and monitoring techniques of the implemented activities. The seminars themselves were organized according to an ODL scheme. Seminars' material[6], contributions of the trainees, questions and answers were constantly fed to the project web's site so that a transnational dialogue, via bulletin boards and extended use of low cost videoconference through the Internet, was stimulated. The seminars provided the teachers with the necessary theoretical background but also offered a series of examples of "good practice" applications. It has to be noted that the material created and used during the test run (January to May 2001) of the project, was revised and enriched during the summer of 2001 according to the feedback the coordinating institution received from the educators having participated in the test run.

- **The provision of arguments in favour of ODL's spread in secondary education**. Going through the databases of ODL projects conducted in the past or currently running, it becomes evident that their major purpose is to help to overcome the necessity of physical mobility. Since this is the purpose of ODL, it is no coincidence that only a handful of projects are focusing on secondary and primary education, as the existence of schools of these levels almost everywhere is a fact, making not an issue the necessity of mobility. Nevertheless, there are cases where ODL practices can play an important role in the learning process. The familiarization of teachers and students with the new technologies, the increasing degree of transnational co-operation as well as the introduction of new, interdisciplinary subjects such as economics or ecology where global interactions consist significant driving forces, present new possibilities and challenges for the implementation of ODL practices in secondary and primary education. In these cases ODL cannot be seen as a substitute of the conventional teaching but rather as a distributed learning environment, an add-on that has to justify its implementation in the school curriculum through the qualitative upgrade it offers to everyday school practice. In such cases of course the educational methodology has to be modified appropriately in order to embody the new capabilities offered by the introduction of ICT. In the new educational environment there must be reorientation and redefinition of the role of both teacher and student, as a more decentralized approach has to be adopted. From teacher-centred learning to student oriented learning the variety of didactical approaches becomes immense. This transition must be done within a well-defined pedagogical framework, which

[6] *More details about the teachers' training material are presented in the chapter about the Teachers' training seminar, p. 42-49.*

will take into account the evolution of the educational practice. This was the direction towards which the AgroWeb project aimed to offer a significant contribution. That is why the evaluation[7] of the AgroWeb project was considered from the beginning of the project to be a matter of great importance since only a few ODL projects had been systematically evaluated so far. The monitoring strategy for the specific project included both quasi-experimental test and on-field observation. The research process that was adopted included all the steps of the scientific inquiry, namely the problem statement, the exploratory question (hypothesis), the description of procedure, the sample, the measurements, the tests and the methodologies during the data analysis. From this accurate evaluation scheme, arguments in favour of the need for wider spread of ODL practices in secondary education were expected to arise, arguments to be distributed through an extended dissemination plan.

- **The presentation of Europe's agricultural diversity through the use of ICT**. Technology is usually accused that it pushes tradition aside focusing on more popular matters for students such as electronic games. However one cannot deny the high potential technology and more specific ICT in education has for combining tradition and other low- fashionable matters with modern school classes and students' interests. If ICT cannot succeed in this, then it is really difficult to find another way of convincing students to deal with tradition and learning. The AgroWeb project tried to offer a contribution to this problem. By exploiting the unique marketing and distribution capabilities Internet offers, by making students deal with what is very modern and they like a lot -learning to create Web pages, with what they most often seem to learn more reluctantly -agriculture, ways of production of agricultural products, etc., AgroWeb succeeded in proving that one can teach everything to everybody, provided that he/she uses the appropriate method for him/her. One of the essential points towards the European integration is understanding and respecting **diversity**. Through the participation to the AgroWeb project students had the chance to realise that this important parameter in the European continent, diversity, exists even in the agricultural sector. Moreover, behind the products promoted there is an amount of aggregated knowledge and experience (e.g. French wines, Greek olive oil). European collaboration, be it at the educational level, or at the commercial, artistic or scientific level should be in a position to take advantage of the huge amount and high quality of European content. Thus, besides providing a unique thematic area for the development of a European interdisciplinary project - incorporating concepts from sciences such as history, chemistry, biology and economics - it also demonstrates the importance of European cooperation in a more competitive world. Through the project's web pages students got to know particular products, like the Austrian "Topfenstaengerl" or the Portuguese wines, they learned about the ways of their production, cultural elements about them and through the e-shop they also had the possibility to buy and taste them.

[7] *For more information about the evaluation strategy and the results of AgroWeb project, please see chapter III.*

2.4 Organisational approach and structure

Managing a project of European scope with about 450 students, 40 teachers and 20 more persons (consultants, administrative staff, developers of the material, Web site designers, etc.) from six European countries is not an easy task. This task would never have been fulfilled without the accurate planning and organisation of activities and the creation of communication channels between all participants. In general management can be thought of as four functions: planning, organising, motivating and controlling. In the AgroWeb project the following managerial aspects were considered, having in mind a secondary school that runs an ODL project:

- Teachers' training
- Incorporation of the project's activities to the school curriculum
- Appointing, inducting teachers and monitoring their work
- Evaluation
- Managing financial aspects

Furthermore, emphasis was given in the adaptation of a user centred design that allowed students and teachers the chance to offer their input in the development procedure of the innovative tools.

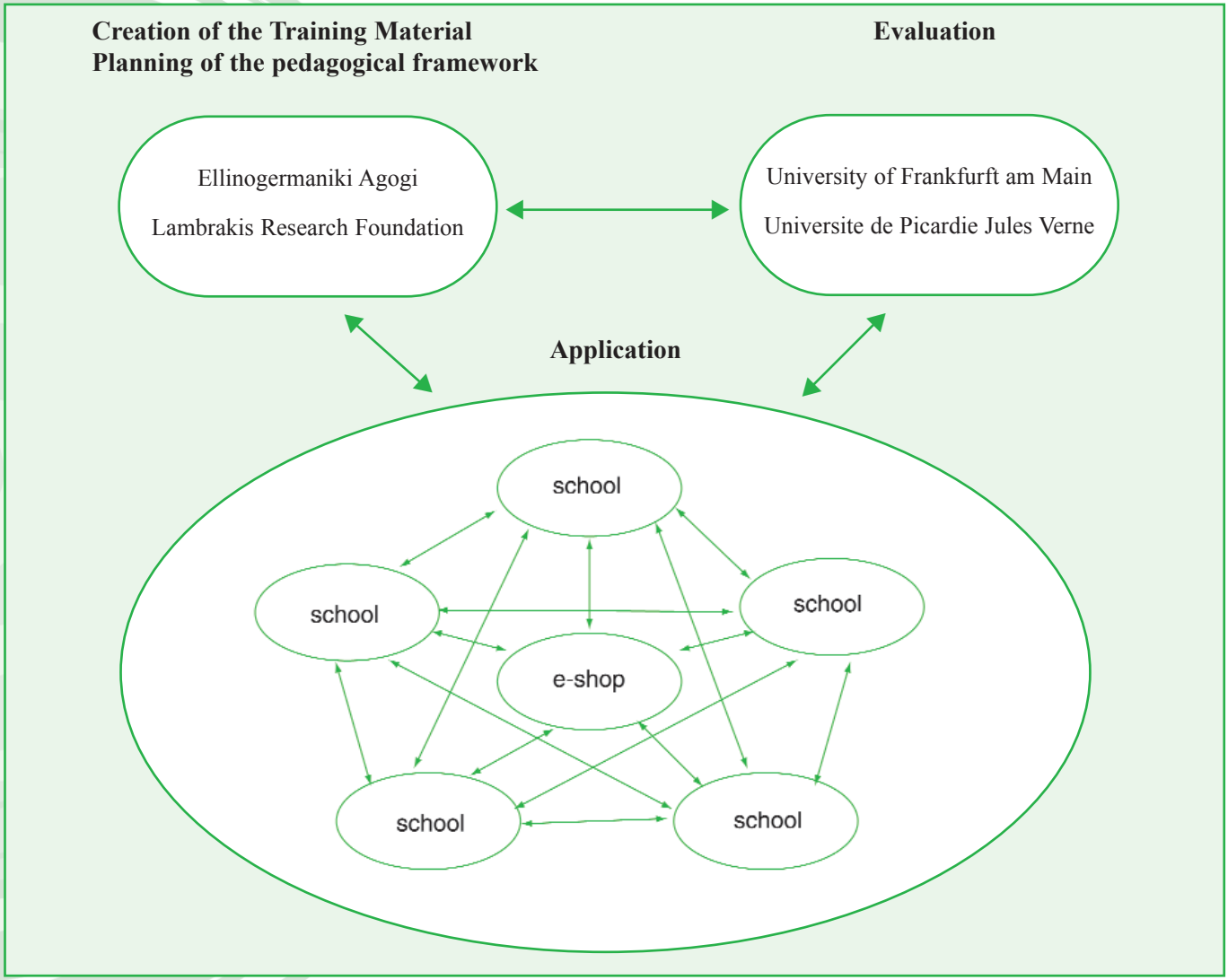
All above-mentioned functions were to a certain degree performed by all institutions, University Institutions, Research Institutes and schools, which collaborated through the project's run intensively. The Universities undertook the evaluation, the Research Institutes (Ellinogermaniki Agogi Research and Development Department, Lambrakis Research Foundation) the planning of the pedagogical framework and the creation of the material for the teachers' training, while the schools tested and implemented the research activities. The participating schools were collaborating and communicating between them not only directly but also through the e-shop Web platform, created especially for the project. The methodology adopted is presented schematically in the following diagram. (Diagram 1)

Nonetheless, co-operation was very intense, especially because of the complementary nature of the contributions of both schools and Universities.

The general organisational approach and structure was set in the partners' meetings, which was held in Athens on the 8-9 December 2000. During the meeting representatives from all the participating institutions had the chance to discuss in detail all the organisational aspects of the project and exchange ideas about theoretical and practical issues of the projects' implementation.

During the test run (January-May 2001) the AgroWeb project was introduced in the classroom at the seven partner schools[8] . The activities undertaken during the project's test run were evaluated in order to allow for the partnership to perform the appro-

Diagram 1



[8] *The partner schools were the following: American Farm School of Thessaloniki (Greece), Beruflichen Sulen des Odenwaldkreises (Germany), Bundesgymnasium und Bundesrealgymnasium Schwechat (Austria), Ellinogermaniki Agogi (Greece), Escola Profissional de Desinvolvimento Rural de Serpa (Portugal), Freiherr-vom-Stein Schule (Germany), Vejle Business College (Denmark).*

priate modifications and improvements to the didactical approach. According to the experience gained from the use of e-shop with the first orders during the test run, the final determination of the structure of the user-interface was made. At the final run (September 2001-May 2002) eight more schools[9] , selected according to socioeconomic and geographical criteria, participated in order to have the project tested in a much wider scale.

The applied methodology ensured the active participation of all partner parties, as it proceeded in the following way: first a prototype version of the e-shop and the e-tool was developed according to the guidelines of the academics and the limited quantity of products promoted. Teachers were also involved in this stage providing significant input from their teaching experience. A test run (first cycle of school-centred work) was performed, in which the e-shop platform was tested and evaluated in real conditions. The final run (second cycle of school-centred work) followed the evaluation of the test run. The improvements and the appropriate modifications were made and the final version of the platform was used in the final run in the second year of the project. It has to be noted that the e-shop was enriched during the final run with the addition of a lot of products, with the introduction of new categories of products, with the optimisation of the e-tool. These cycles of school-centred work were not only meant for evaluation purposes (technological and pedagogical) but also aimed to involve teachers and students in giving direction to the project and its technological and pedagogical results. The aim was to help both teachers and students reach beyond "cliches" to the areas in which they could make **the most valuable contributions,** and **potentially increase their role in the project.** To assure maximal usability of the new tool and realistic evaluation of the pedagogical effects, the developed software add-on used a heavily **student-centre approach**.

2.5 Pedagogical and didactic approach

The main pedagogical and didactic approaches adopted in the AgroWeb project, actually the results of the long research articles and experience of the partners, for the establishment of the project's effective learning environment were the following:

- **Learning should be a collaborative experience**: The project was based on the creation of a "virtual classroom", which means that every possible aspect of a conventional classroom was simulated. In this new classroom students and teachers from European countries came into contact exchanging ideas and experiences. In a real classroom students' collaboration and interaction is one of the most essential characteristics of success of the didactical approach. Thus, in the AgroWeb project a continuous effort was made to stimulate students' interaction. In the framework of the project students were asked to collect appropriate and "marketable" content on the products they were going to sell electronically, in order to present them on the web. Students developed a business plan for the product's commercialization and allocated the workload with their virtual classmates either horizontally (e.g. across activities such as digitization of the content) or vertically (across products). Finally, they determined "bundling" policies together with their virtual classmates in the other European countries in order to attract the consumer wishing to taste a basket of various European goods. At the same time students studied, analyzed

[9] The new schools were the following: Anatolia High School (Greece), Chania 4th High School (Greece), College Pierre de Coubertin (France), Escola Profissional da Regiao Alentejo (Portugal), Mytilene 3rd High School (Greece), Pinewood-The International School of Thessaloniki (Greece), Platanias High School (Greece), Thouria High School (Greece).

and finally compared the performance of the products with the targeted performance according to the original business plan. This comparison formed the stimuli for a dialogue with virtual classmates through various communication channels the e-shop platform offered (bulletin board, videoconference, electronic publication of project's magazine). During this dialogue questions or comments of one student could be addressed and answered from a remotely located classmate or teacher. Like this students from different European countries got to know each other and cultural elements among other elements were transmitted. The goal of promoting transnational cooperation and the use of new technologies to overcome barriers of physical mobility was targeted and achieved through the use of the AgroWeb e-shop platform and the use of the e-tool.

- **Participation enhances learning**: It is widely held that increased students participation stimulates interest. Almost all learning happens best when coupled with experience, practice, trial-and-error and hands-on activity. The student's self-action must be the leading element in the teaching process. The learning environments are dependent upon the students traversing their own pathways, asking questions, finding analogies, experimenting and exploring their surroundings. Students were more likely to feel a sense of personal investment in the promotion of the agricultural products of their areas, as they were the ones who were involved in the whole procedure before the selling of the products to the interested "customers"-virtual colleagues. Preliminary results on the teachers' observations reinforced this belief. Thus the participation of the students at all steps of the AgroWeb project was tried right from the beginning to be safeguarded. More specific, during the implementation of AgroWeb project in schools, students were asked to identify traditional agricultural products that played a significant role in the history and in the socioeconomic development of the area. Following the selection of the most representative products, students negotiated with the local producers for the acquisition of a limited amount of products in exchange of promoting them in the Internet in the framework of the project. After the agreement students developed a business plan for each product including all the appropriate stages: market research, price determination, distribution and promotion policies with emphasis to the use of new media and future perspectives. Students also had the possibility to comment on the project and influence the continuous development of the e-shop platform.

- **Need for cross curricula approach**: Interdisciplinary is crucial towards enhancing the effectiveness of education. For instance students participating in the AgroWeb project collected information on the history of the wine and the oil that are produced in their areas (in the framework of the history class). Simultaneously they investigated relevant chemical and ecological data about the products they were marketing and their special features as compared to the competition (in the framework of the chemistry class). They designed attractive trademarks of the products to commercialize them in the most efficient way (in the framework of their art class). Finally the performance of the products was monitored with the use of the additional features of the e-shop platform (in the framework of the civic economics class), giving students the opportunity to evaluate the planned strategy and modify the business plan accordingly. Students creating business and media coverage plan for their products and following up the performance of the products promoted, developed a subtle and deep understanding of the "laws" and needs of the market, of e-commerce procedure and the world of business in general.

- **The development of an interdisciplinary model in current educational practice**. It has been already mentioned that interdisciplinarity is crucial towards enhancing the effectiveness of education, since it provides a unique way of strengthening learning processes, such as discovering analogies, similarities etc., while providing application examples, which are inherently closer to real world problems. In recent years, there is a **clear focus on interdisciplinary education**. This

approach supports that educational experiences should be authentic and encourage students to **become active learners, discover and construct knowledge**. Authentic educational experiences are those that reflect real life, which is multifaceted rather than divided into neat subject-matter packages. Indeed, interdisciplinary instruction exploits the natural and logical connections that cut across content areas and is organized around questions, themes, problems, or projects rather than traditional subject-matter boundaries. Artificial barriers among subject areas are eliminated and students are given a broader context for solving real-life problems, which demands the development of analytical, interpretive and evaluative skills used in many subject-matter areas. This kind of learning is definitely of greater value to students. On the other hand, teachers are faced with a real challenge. Having been specialised in an academic discipline may cause frustration to them when it comes to creating interdisciplinary, cross-curricular activities. Such activities demand considerable knowledge in many areas, which they may lack. Collaboration with their colleagues may help them overcome this challenge, develop positive attitudes to interdisciplinary learning so as to gradually adopt it and make it part of their teaching practice. Students participating in AgroWeb project learned but in no traditional way. They acquired knowledge on various subjects, like History, Geography, Chemistry, Economics, Informatics, English language, etc. through their involvement with the project. By translating in English the texts they had prepared for the presentation of the products, by creating Web pages for these products, searching for information on the Internet, by learning about the ways of productions eg. chemical reactions for the preparation of a particular type of wine, they deepened their knowledge in the respective fields. The aim was one and common to all schools and students: follow the activities of AgroWeb project. The means and the subjects that contributed to the successful implementation of these activities were multiple and actually proved the interdisciplinarity of the project's approach.

- **The development of new educational tools and learning environments.** The partnership developed a user interface to be an adding on tool, a software educational tool that supported teachers and students in the new learning scheme. The main emphasis on the user interface was the improvement of the interaction between students and the universe of digital services. The AgroWeb learning environment proved to be very effective. It contained the e-shop and the e-tool. In the e-shop all products were presented in the specially created pages made by the groups of students. The products could also be bought via the e-shop. The e-tool served as a way of following up the activities of the e-shop. The groups of students could monitor the financial activities of their involvement in the project through the e-tool which gave the possibility to them and whoever else interested to view the sales of a specific product during the month, to see the distribution of these sales in the different countries-consumers, to compare the sales in different countries as well as the estimated sales -according to the business plan made by each school about each product to be promoted- versus the actual ones.

- **Pedagogical and technological innovations have to be systematically evaluated**. Most electronic tools (software, CD-ROMs, Internet sites) used in education have never being concretely evaluated. The AgroWeb consortium stated right from the beginning that the evaluation of the pedagogical impact of the tools was a very important aspect. The didactic approach of the project was evaluated according to an academic valid scheme, based on well-defined methodologies. The aim was to develop a better theoretical framework on how different types of tools, like the e-tool of AgroWeb project and learning environments, support different types of thinking, reasoning and understanding. From this accurate evaluation scheme arguments in favour of the need for wider spread of new practices in everyday teaching arose.

2.6 Applying the project in the classroom

In the AgroWeb project the subject of the promotion and e-commerce of local agricultural products was chosen because it helps the interdisciplinary approach and is beneficiary not only for the students but for the teachers too. And of course there were a lot of social and cultural effects of the project that a teacher could use to stimulate students in other lessons like Geography or even History. The social channel of communication could be used to support teaching in many ways. The students are the citizens of tomorrow. They should be prepared - among other things - to live in the so-called "global village"[10]. So an interdisciplinary subject is easier to integrate in the curriculum than a "conventional" non-interdisciplinary one because the teacher will have much more time for the project's implementation during the school weekly program. The time factor is critical in an ODL project implemented within the framework of a conventional educational institution. Another reason for choosing the subject of e-commerce was that it would give the opportunity to the students involved in the project to get to know essential elements of the business world of today as the rest of their classmates not participating to the AgroWeb project would also do in the framework of the Economics class. This fact was very important in order to have an "experimental" and a "control" group for the statistical evaluation of the project. In this way the proposed approach to teaching was researched in order to determine whether it is possible to have students actively involved in a learning process without having to go through conventional teaching. What proved to be really striking in the course of the project was the fact that there were differentiations in the overall impact-learning as well-, between participating students coming from conventional schools and students coming from technical-business schools. This element was also proven by the results of the evaluation, which are presented in detail in chapter III[11].

In the analytical description of the activities that took place during the run of AgroWeb project, we will try to present the positive as well as the negative or needing improvement aspects, so as to let the readers -potential appliers of the general idea of Agroweb or of similar type projects- learn what they have to adopt and what to avoid in order to implement similar activities successfully. The information and experience acquired from the test run was used for the implementation of the activities of the final run. May the experience from the final run prove to be useful to those who will continue the project or will try to introduce ODL practices and innovative subjects in the everyday school curriculum.

[10] "Since Marshall McLuhan coined the term in the 1960's, few of us have truly understood what the term "global village" means... today, growing thousands of people in dozens of countries around the world are living the reality of the global village in personal, hands-on, interactive ways. Through the medium of networking and telecommunications technologies these students are for the first time learning to think of themselves as global citizens, seeing the world, and their place in the world, in ways much different that their parents" (Rogers 1995).

[11] It has to be stated that for the evaluation there were only the partner schools that participated. These were the following seven: American Farm School of Thessaloniki (Greece), Beruflichen Sulen des Odenwaldkreises (Germany), Bundesgymnasium und Bundesrealgymnasium Schwechat (Austria), Ellinogermaniki Agogi (Greece), Escola Profissional de Desinvolvimento Rural de Serpa (Portugal), Freiherr-vom-Stein Schule (Germany), Vejle Business College (Denmark). For more information about the evaluation procedure, please go to chapter III.

2.6.1 Communication

Videoconferences

Generating and supporting dialogue within an ODL project, or using a conferencing system as a supplement to face-to-face teaching, is a serious challenge if the Web is to serve as an educational medium. A distance-learning project where the learners have never met and their only means of contact with each other and the tutor is the conference system must be the most challenging situation of all. Such a project provides a lot of opportunities for the beginning of discussions, exchange of knowledge and culture, and even for the creation of "friendships". Students showed a great interest in videoconferences and during the life cycle of the project they became more familiarized with the procedure and created relationships with their virtual classmates.







Figure 1: Moments from the Videoconferencing.

Bulletin Boards

Asynchronous computer mediated communication has reached a state of maturity. Synchronous ways of communication actually dominate the field, as they are more direct, fast and satisfactory for the participating parts. However the use of Bulletin Boards cannot be considered as dated, as they have a lot of advantages. Opportunities still exist for innovative ways to integrate conferencing and the web. The structure of a really useful Bulletin Board must be hierarchical containing important information essential for the following up and the contribution to a dialogue. There are three pieces of information that should be always available: attribution (who said what), sequence (in what order) and relationship (to whom). This much seems common sense and most systems (but not all) have this information. Because an interchange in a web conference may well take place over a period of weeks it is important that this information is easily visualized and accessible to anyone interested in it. A learner returning to a conversation some days later, or catching up on new messages, needs this detail in order to respond and contribute to the discussion. Students and teachers participating in AgroWeb project had the chance to use not one or two but four different Bulletin Boards. One Bulletin Board was created for the communication of teachers between them during the teachers' training online seminars (see Figure 2).



Figure 2: The teachers' bulletin board. A live dialogue, questions and answers were presented on the project's web site.

In the following, it was considered useful to create two different Bulletin Boards, one for students of younger age, coming from conventional schools and one for students of more mature age, coming from business-technical schools. In this way an effort was made to let students which would be more likely interested in the same things use the same Bulletin Board. It has to be noted that the two student Bulletin Boards were created in this way after the demand of the students themselves. In order however to let students who wanted to communicate with all students participating in the project express their opinions in a place seen by everybody, a third student Bulletin Board was created for all schools (see Figure 3).



Figure 3: AgroWeb students' Bulletin Board.

2.6.2 Preparatory activities

According to the Workplan of the project and in order to let the project begin in the schools, one had to create the appropriate learning environment for the students before. The **construction of the Web site of the project** with the e-shop, the e-tool and their various components was discussed in detail during the first partners' meeting on the 8-9 December 2000 held at Pallini, Athens, Greece. During the meeting a sample of the proposed approach for the Web site of the project was presented to the representatives of all partners of the consortium, the sample was commented, suggestions were made.

Moreover, the **structure of the e-shop** was determined with the consensus of everybody. As far as the e-shop is concerned it has to be noted that there were various aspects that had to be considered. The AgroWeb project made full use of the capabilities the web offers. In order to stimulate students' interaction a web-based e-shop platform was developed. In the design of the e-shop platform proper weight was given on its educational concept. It was a tool for students, a distributed learning environment, facilitating the learning process. It included facilities to produce graphical representations of the sales of a product (product's performance), to compare actual and anticipated performances and in general what is necessary to monitor the financial activities of a real shop. Two main objectives were targeted. First, to address clear educational needs such as familiarization with graphical representations and determination of which quantities depend on each other and second, to guaranty full freedom of the students in choosing the form of graphical representation. The role of the e-shop platform was significant, as the e-shop was the electronic AGORA, the "electronic open market", where in addition of the commercial transactions the person to person contact of all transactions and exchanges of ideas, the place in which the students had the chance to realise in praxis the importance of the European single market and the common European currency.

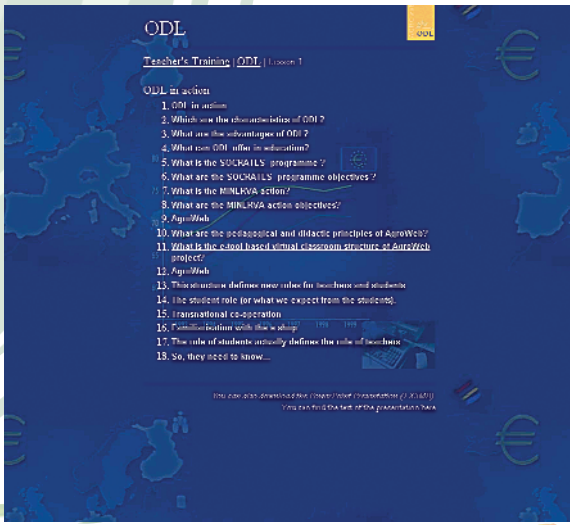
After the meeting and until the end of January the fist version of the Website of the project was prepared according to the contributions of all partners and the teachers' online seminars began. The last preparatory activity before the introduction of the project in the classroom was the **preparation of the teachers' training material**. As it has already been noted before, the project aimed to provide teachers an effective training that would accustom them with the use of modern ICT and allow for the incorporation of ODL elements in their teaching practice. The coordinating Institution with the support of Lambrakis Research Foundation and a team of experts in the Athens University of Economics and Business (Greece) organized training seminars addressing the issue of ODL application in secondary level education. Emphasis was given to motivation problems, ability to handle ICT and evaluation and monitoring techniques of the implemented activities. The seminars themselves were organized according to an ODL scheme. Seminars material, contributions of the trainees, questions and answers were constantly fed to the project web's site so that a transnational dialogue, via bulletin boards and extended use of low cost videoconference through the Internet, was stimulated. The seminars provided the teachers with the necessary theoretical background but also offered a series of examples of "good practice" applications. After several meetings it was decided to split the material in three sections: ODL, E-commerce and Guidelines for teachers. The three sections were presented in the form of three books that were clickable (see Figure 4).



Figure 4: The three books for the Teacher's training seminar.

It goes without saying that the material that was presented in the beginning of the test-run of the project, so in February 2001 was enriched and revised according to the participants' contributions. Teachers were welcome to give their feedback, offer their lesson plans to the consortium. All lessons were held online, were uploaded in the project's Website in a devoted section. The more detailed structure of the material for the online teachers' training seminars is presented in the following.

The first book, entitled ODL contained two chapters. The lessons of the first book were available on the Web in two forms, as Word texts and as Power Point presentations, letting teachers download and use them for their teaching (Figure 5).



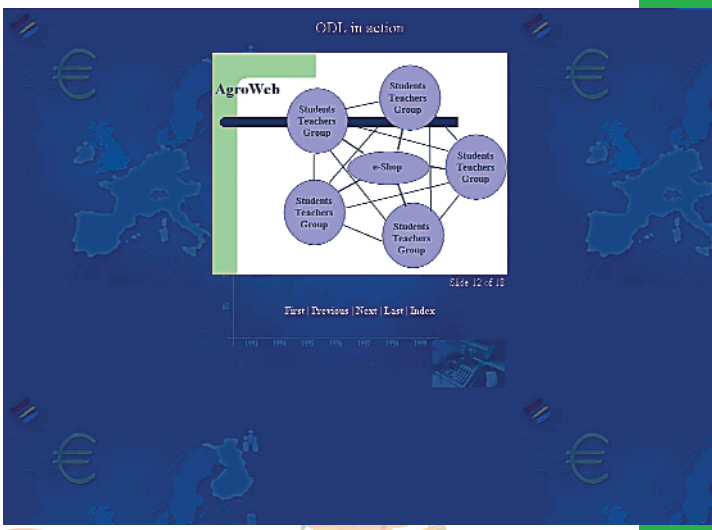


Figure 5: The structure of the lesson: ODL in action. The lesson is presented in form of Power Point slides but in Word format as well.

The second book about e-commerce contained very extensive material. The general structure of the final version of this book is presented in Figure 6.

Agro Web Guide to the Internet and E-Commerce

- Introduction to the Internet and the World Wide Web
  - Definition of the Internet and the WWW
  - Internet Growth
  - What can someone do with the internet
  - How does the WEB Works
- Internet terminology
- Finding Information on the WWW
- Introduction to e-Commerce
- E-Commerce Business and Technology Model
- E-Shops
  - E-Shop Generations
  - Characteristics, Functions of e-shops
- Opening Your E-Business
  - Promote your site in order to build traffic and sales
  - Designing Your Electronic Presence
    - Basic Web Site Structure
    - Web Development software
    - Graphics Software
    - Shopping Cart Software
    - Shopping Extras
- Electronic Money
- Product Delivery
- Product Shipping
- Promotional Methods

Figure 6: The structure of the second book about e-commerce.

It is impossible to show in detail the whole material prepared by the team of the University of Economy and Business of Athens in collaboration with Lambrakis Research Foundation, who assured that the material, was presented in a form appropriate for ODL. As an example two lessons are presented in the Figure 7. It has to be noted that the material as a whole varied in level of difficulty, as it was agreed to include even lessons of very advanced level for teachers experts in the specific subjects who wished to enrich and deepen their knowledge. It was however mentioned to the participants that they should not use everything in their teaching but they could choose among a rich variety of lessons what to learn, what to give the students, what to apply in the classroom.

What is e-Commerce

e-Commerce in its purest form is simply any business transaction that takes place via digital processes
However, e-commerce is really much more than just exchanging products or services for money over the Internet. e-Commerce is:

- an **enabling technology** that allows businesses to increase the accuracy and efficiency of business transaction processing and
- a way for organizations to exchange information with customers and vendors to the benefit of everyone involved.

What does e-Commerce transform ?

- the way products, services, and even information are brought, sold, and exchanged
- the way organizations interact with customers and business partners.

Eventually, e-Commerce will probably replace the movement of paper within and between organizations, as well as between organizations and consumers.

Types of e-Commerce

1. Business-to-Consumer e-Commerce (B2C)
2. Consumer/Citizen-to-Government e-Commerce (C2G)
3. Business-to-Government e-Commerce (B2G)
4. Business-to-Business e-Commerce (B2B)

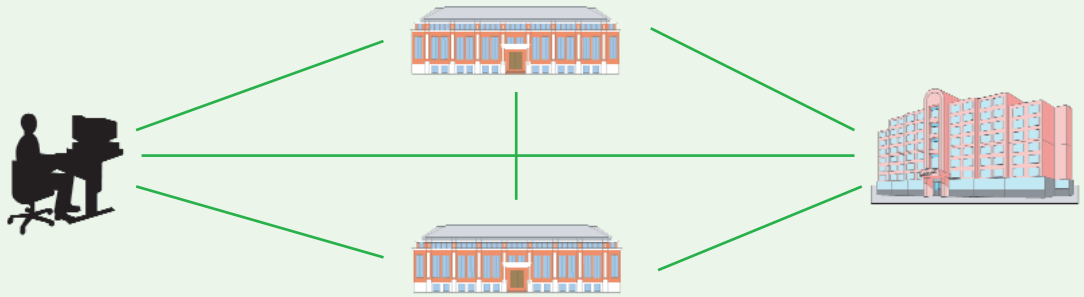


Figure 7: An example of a lesson about the introduction to e-commerce, contained in the second book of the teachers' training material.

The third book contained some Guidelines for teachers: lesson plans created by and for the teachers participating in the project, directions of how to do a videoconference, or how to create a business plan .

These lesson plans dealed with Following up the selling of the projects (on a weekly basis) and the Creation of the Webpages of the products. It also contained three Business plans, a contribution offered by the Vejle Business College in Denmark, a school-expert in the Business matters. The lessons plans are presented in the Figures 8 and 9.

Follow up of the selling of the products (on a weekly basis)

Aim: Familiarization with the e-commerce structures, with the use of graphical representations

Ways: Use of graphical representations, use of Business Plans (Vejle Business College), observation

Activities:

- Go to the AgroWeb e-shop
- Check the commands of the products promoted by the school
- Check the hits of the persons having visited the Web page of the products promoted by the school
- Compare the commands and the hits of last week to the ones of the previous weeks and to the hits and commands of the products of other schools by using graphical representations
- Discuss about the results (What went well? Which country ordered the more products? For which country's market should the efforts be intensified? Which are the characteristics of this specific market? What didn't work? Should the Web page become more user-friendly? Should the price of the products be lowered?)
- Decide about the interventions to the Web page or to the market policy
- Proceed with the accomplishments of the commands
- Make a prevision about how and to what extent the commands and the hits are expected to change because of the interventions

Results: Ameliorate the ways of the promotion of the products and their impact to future customers; be more effective in the e-commerce competitive practice

Figure 8: Lesson plan: Following up the selling of the projects (on a weekly basis).

Creation of the Web page(s) of the product(s)

Aim: Familiarization with the Web tools

Ways: Use of Web page creation tools

Activities:

- Gather all the texts about the product(s), the photos, the graphics, the trademarks
- Examine the proposed by the students layouts of the page(s) of the presentation of the product(s) and compare it to the standard layout proposed by Ellinogermaniki Agogi
- Decide upon the most attractive, user friendly, effective layout for your products
- Check if you have replied to all the questions about the product set in the Forms sent to you by Ellinogermaniki Agogi
- If you have chosen your own layout, start structuring and creating your presentation. You can use the directions given in the lesson The use of Web authoring tools

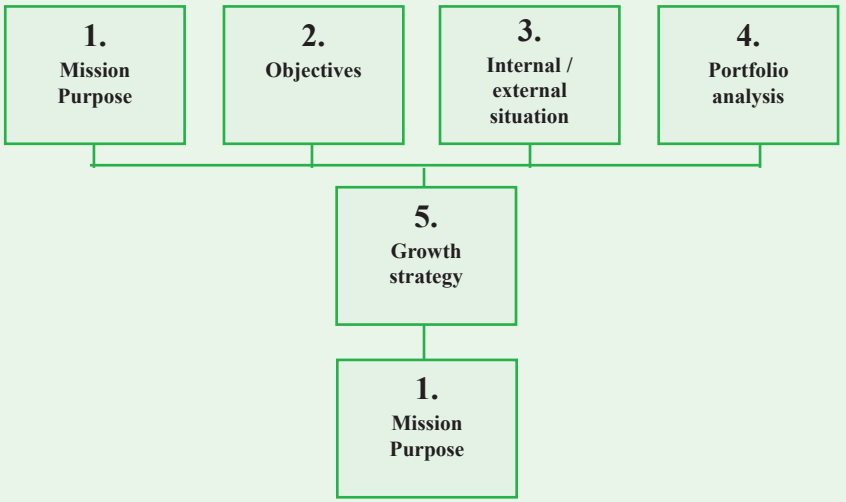
  http://www.ellinogermaniki.gr/ep/agroweb/htmls/lessons/guidlines1/odl.htm
- Or send your material to Ellinogermaniki Agogi (webmaster@ellinogermaniki.gr) in order to have it uploaded to the server

Results: Find the most effective way of presenting and promoting a product

Figure 9: Lesson plan : Creation of the Webpages of the products.

Teachers used all this rich material through their implication in the project. They added, modified, contributed to its creation in two rounds (test and final run), and that is why one can say that what is available on the Web after the end of the project's run, in the respective section is the result of the collaboration of both experts and practical experts-teachers and thus is really useful and practical for anyone wishing to follow the same didactical approach or implement the same activities. Teachers used especially the lessons with directions on how to create a business plan (Figure10), how to proceed to a videoconference (Figure 11) and how to create Web pages easily. The seminars had a duration of one month each time - there were two seminars in total, one during the test and one during the final run, the material was online, as it has been mentioned and teachers' received information about the new lessons each time one of these were uploaded. Then it was up to them to study, choose what topic interested them and use it in the way they considered useful.

AgroWEB Business Plan



Ad 1. Purpose (What business are we in?)

Vision/direction (Where does the company see itself in the next years)

Values (Philosophy of the company)

Ad 2. Corporate objectives (e.g. market share, sales growth, return on investment, shareholder value etc.)

Ad 3. SWOT (strengths and weaknesses, opportunities and threats)

Ad 4. Value chain analysis and Boston Box (growth-share matrix)

Ad 5. In which direction wants the company to grow (existing market, broaden product range or geographical scope or diversify into new area or make a new distribution) Organic growth, merger, acquisition or collaborative activity? What position wants the company to adopt along the value chain (backwards integration towards suppliers or forward integration towards the buyers)

Ad 6. Broad scope, narrow scope, low cost, differentiation

Figure 10: An example of a Business Plan.

The procedure of a videoconference

Aims and Objectives

- Learn what hardware and software are needed for a videoconference.
- Install the necessary equipment.
- Realize a videoconference.

1. What is the equipment needed for a videoconference?

o A Computer with Internet access
o A web camera, a microphone and loud speakers for the computer
o A software for videoconference, for example Microsoft Netmeeting

2. What is a Web camera and how much does it cost?

It is a small digital camera with a cable that connects it to the computers' parallel or USB port. It has very low cost but not very good picture quality.

3. How to install the Web camera?

Shut down the computer and plug the camera to the parallel or USB port. Boot the computer and it will automatically recognize the new device. Enter the camera setup CD-ROM or disk provided to you with the Web camera in order to find the corresponding drivers.

4. What are the parameters needed for the installation of Netmeeting?

Your First Name, your Last Name, your e-mail address and some comments.

5. What it the IP address and how we can learn our IP address?

Every computer that connects to the Internet has a specific IP address. This address remains the same as long as we access Internet - so if we connect with dial up every time we hang up it changes. Inside the Netmeeting we choose Help from the menu topics and our IP address is displayed.

6. How can we make the videoconference?

We phone though a separate telephone line, or just exchange e-mails with our distant partner and we ask him to tell us his IP address. We type his IP address into the Netmeeting window and we press dial. He accepts the dial and then we can communicate.

7. What we must know about the Netmeeting adjustments?

The poorer the sound quality the better the image quality is. The better the sound and the image, the slower the communication. In order to have better and quicker communication, we could either reduce the frame of the image or the quality of sound and/or image.

8. What other possibilities Netmeeting offers?

Chatting when sound quality is poor. The possibility to paint together via Internet.

Figure 11: How to proceed with a videoconference.

2.6.3 Introduction of the project in the classroom - Students' activities

- **Selection of the products**

Students in all schools were asked to select one or more products form their local areas in order to promote them on the Web. These products should be not only local but having a historical, a significant role in the socioeconomic development of the area. Moreover, they had to be marketable. This was not an easy task, but after thought, many suggestions and discussions, students decided what they wanted to promote. During the test run, the effort was focused on one product per school in order to examine how the students would handle the workload and have the necessary experience for the final run, when students could promote as many products as they wanted. Some of the products that were promoted are presented in the Figure 12.



Figure 12: Some of the products promoted in the framework of AgroWeb project.

- **Meeting the producer**

In the following, students chose a producer, individual or company. They discussed with him/her at first on the phone and had his/her agreement to participate in the project. Representatives of the students visited him/her, presented him/her the project's activities and negotiated a certain amount of products for their promotion on the Web in the framework of the AgroWeb project. So they either obtained the products in very low prices, or obtained them for free. Then, students visited him/her either as a small group, or the whole class involved in AgroWeb. They were shown the ways of the productions of the products, they tasted the products they were going to promote, asked questions, interviewed the producer (See Figure 13).





Figures 13: Visiting the producers.

- **Collection of information about the products**

Students were asked then to collect in groups information about the products and in general about their Websites. Some wrote down the interview of the producer, some others searched on the Internet, others took photos of the product, others found out recipes made with their products. The distribution of the workload was the responsibility of the teachers involved but of students as well, since one could choose where he/she would like to work. History, Geography, Chemistry, Arts (for the creation of logos) were some of the subjects that were implicated in this stage of the project.

- **Writing down-translating the information**

Students could of course create their Websites in their national language, they had however the obligation to have it translated in English for others to understand as well. So in the framework of the English class, the groups that were responsible for the translations of the texts, translated the material for the Websites in English (See in the Figure 14 the site of one of the schools in Portugal in Portuguese).



Figure 14: The site of the Escola rural di Desinvolvimento Rural de Serpa in Portuguese.

- **Creation of Web Pages for the products**

After having gathered the information needed, students all together in groups, or the special group per school, which dealed with Web design, tarted creating Web pages for the products. They used either the way that was indicated in the Teachers' Training Seminar, First Book, or other programmes taught to them by their teachers. Even one class of students as young as 13 years old in Anatolia College (Greece) created Web pages for their products on their own. Students included in the Web pages all the information gathered and also added links to their schools' Web sites, their classes', the main AgroWeb Website, The e-shop, etc. They revised and reconstructed several times the Web pages they created adding pictures, small advertising Videos. In the following Figures (15,16) some samples of the Webpages created are presented.



Figure 15: The Websites of the Freiherr-vom-Stein Schule and of the 4th Chania High School.



Figure 16: The Website of the American Farm School.

- **Creation of Business and Dissemination Plans**

Each school had to create in the framework of the Economics class a Business plan for the promotion of each one of the products to be promoted. They all had at their disposal the three Business plans (from the simple to the most complicated-advanced one) created by the Vejle Business College, which was an expert school, partner in the AgroWeb project. They either used one of them, or created a new one in order to estimate which about would be the sales per week of their product. They then gave their estimations to the coordinating institution, and the responsible team for the e-tool inserted this kind of data in the tool. Students also created an extensive dissemination plan for the promotion of their products. Others created posters to hang out at their schools, other made some videos, or advertisements. Their Web pages were constantly fed up during the run of the project with their ideas about the promotion of the products. Moreover, a lot of open days were organized in each school to promote the project's activities to parents, teachers and other students not participating in the project in general.

- **E-shopping period**

The e-shopping period lasted one month during the test run and four months during the final run. The results were amazing. 82 orders in total (only 3 proved to be a joke or unsuccessful trials). Through the especially created e-shop platform students could order what they wanted, put the products in their virtual basket and received by mail a receipt. The e-shop was considerably changed during the project's run. After the test run, it was reconstructed, expanded under the guidance of the consultant of the project from the University Paris Sud-Orsay. The remarks students and teachers made were taken into account and materialized. In the following Figures (17,18) one might see how the e-shop was constructed.



Figure 17: The e-shop during the Test run.



Figure 18: The e-shop during the Final run.

- **Following up the financial activities of the e-shop: the e-tool**

A very important parameter of the project was the e-tool, which consisted an educational tool, giving students the possibility to visualize what the selling of their products were each week, from which countries the selling had been made, to compare the estimated and the actual sales, etc. They could then discuss whether their estimations were right, if not what they could do to promote more their product in the "market", to enhance their selling. Urgent measures were taken, special offers were made, the business plans and dissemination plans were modified or completely changed. See in the following Figures (19,20) the capabilities the e-tool had.



Figure 19: The distribution of the selling of a product per country.

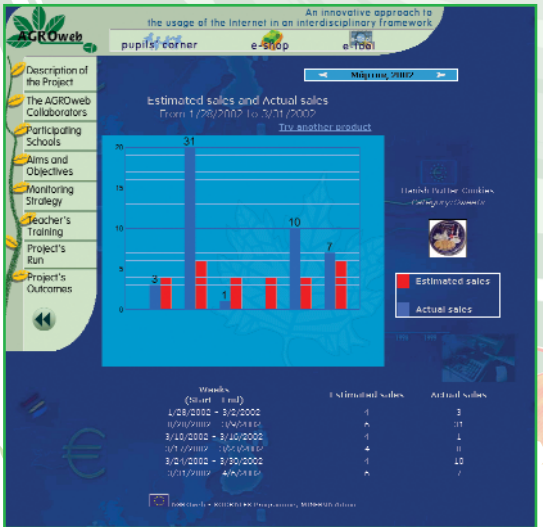


Figure 20: The estimated versus the actual selling in a month's time.

- **Communication-Discussion of the results- The AgroWeb magazines**

It has been already mentioned how the communication through Bulletin Boards and Videoconferences was made in the framework of the AgroWeb project. What has also to be noted is that students participated between them through the six issues of the AgroWeb magazines as well (Figure 21). In these magazines, published in both electronic and conventional-hardcopy form, students sent their commercials, their texts about the products, photos from their schools and of themselves.



Figure 21: The 6 issues of the AgroWeb magazine.

- **Receiving the products**

A major problem for the consortium, and mostly for the coordinating institution, was how to transport the ordered products to the schools, what would be the ideal time interval for the transports. This proved to be a bigger problem than what was initially expected, as the cost for the transportation of a limited account of products is in general very high and would discourage the orders. This cost could not be covered in any way by the budget of the project. So in the first place there was an effort to attract sponsors for the transportation of the products. Two sponsors responded, DHL courier company for transportation outside Greece and Fterotos Ermis for the transportation inside Greece. They decided to cover all expenses but in a limited number of orders. So it was decided to have to transportations had. One when all products would have to come to Greece for the major closing event and one just after the event. The first transportation would cover all orders up to then and the second one would also cover the orders made through the event.

- **The AgroWeb closing event**

On the 20th of April there was a major closing event at Pallini, Greece with the participation of all partners, academics, experts and schools having participating in the project. All products were transported in Athens, each school had its stand and promoted its products via the e-shop. Talks were given by distinguished academics and experts about the e-commerce, agriculture and education and ICT in education. The event was a great success (see Figure 22).











Figure 22: Photos from the AgroWeb closing event.

2.7 Personal impressions from the teachers and the students participating in the project

From the reports teachers sent in the end of the project and the remarks made and letters sent by students, it seems that the results of the project were the following:

Students showed enthusiasm and eagerness right from the beginning to participate in the project, they in some cases even taught themselves each others, included their teachers, how to work with the Web more efficiently and alternative ways of creating Webpages. They created their own Websites for the promotion of their products with a link to the AgroWeb home page. It has to be noted that most schools created a first version of their AgroWeb Website during the first year of the project's run to have it revised or in some cases totally reconstructed during the final run of the project with the addition of more products for promotion. The students have experienced the fact that teaching and learning are no opposites but complementary activities, that partnership between students and teachers requires the students' willingness to co-operate and offers them the chance to use their initiative. They have become aware that the exchange, the pooling of knowledge is most efficient as no individual can ever be omniscient. They have also come to accept that learning is an element of any individual's life independent of age or position - the need of lifelong learning. As it was noticed by Markus Artner, teacher in Bundesgymnasium und Bundesrealgymnasium Schwechat, Austria: *"European projects are a welcomed change to normal school life..... cause a lot of motivation and activation, especially the web design, the excursion to producers, its the practical relevance that is important for students."*

There were many cases when students because of their implication in the project's activities have considered very seriously the possibility of working in respective fields, e.g. in Web design, or e-commerce. From the intense collaboration between companies-producers and students, there were also cases where companies asked from some of the students to work for them as trainees not only after the end of school year but in a permanent perspective. The innovative activities of AgroWeb increased students' interest in the school, gave ideas to the school council to introduce such interdisciplinary approaches to the everyday curriculum officially, e.g. in the American Farm School (AFS) from September 2001 there will be a new subject in class. This is how Reba Georgiadi, teacher in the AFS, describes it: "*The AFS also had very high student interest. We will add a new course, E- Commerce, to our curriculum, based on our experience with this project. The school administration had an opportunity to see the effects of integrating information technology with the curriculum and the enthusiasm this generated from students and other faculty. In addition to the new course, we will add an AGROweb-type project to our Computer Science/Business course plan (permanently)*". Moreover, in the Pinewood - The International School of Thessaloniki Pinewood a web development course has been added, that will be mandatory for business students, to be taken concurrently with the business planning course. In the Vejle Business College, in Denmark, students involved in the project went one step further. They created their own company for the promotion of their products to the local community. Since the AgroWeb project was a school project and worked between schools, they -it has to be noted that these students were very experienced in subjects such as business, and finance-, they took the initiative to expand the project to any customers. And according to their teachers' reports and their testimonies, they did very well and sold out their whole stock

2.8 Impact of the project on the teachers, students, local communities

This project mainly targeted **teachers** and **students** in secondary schools.

Teachers directly benefited by the on-line training seminars and the experience gained in running an ODL interdisciplinary project. Both are considered as practical useful and academic valid help to any educator who will decide to incorporate ODL and ICT practices to his/her daily teaching. Teachers that have by themselves experienced the qualitative upgrade the introduction of ODL can bring to the teaching practice are definitely effective "promoters" of the idea in the educators' society.

Students participating in the project have benefited from the qualitative upgrading the introduction of ODL was expected to offer to the "conventional" teaching. They had the opportunity to use the web as an interactive communication medium and co-operate with virtual classmates remotely located and by this expand their learning experiences. At the same time they learned about European agricultural products and became familiar with e-commerce and the common currency. This procedure helped them either as perspective consumers but more importantly it served as vocational training, equipping the students with skills that are very important for tomorrow' s citizens.

However, **local communities** profited as well from the project, through the promotion of their products, through the open days students organised all around Europe.

The AgroWEB project has also been selected by the European Schoolnet among over 1000 submissions of educational projects. AgroWEB was at first selected among the TOP 100 submissions and then as one of the 22 finalists in the category of Sun Microsystems eSchool Award (Figure 23). Representatives of the selected projects were invited in Lisbon on the 6th December 2001 for the eLearning Awards Ceremony, during which they showed off their achievements to experts from ministries of Education and private companies.



Figure 23: AgroWEB's certificate from the eLearning Awards 2001 in Lisbon.

2.9 The innovation of AgroWeb

The AgroWeb project realized an innovation in school education, targeting the meaningful application of ICT in an interdisciplinary approach of the learning process. It also initiated necessary measures to prepare students for their future active participation in e-commerce, since this new form of commerce rapidly increases and represent a common practice in Europe's near future. Undoubtedly e-commerce is a challenge for Europe as the European Union is an attractive market of 370 million people with one single currency, the EURO. Through the use of the e-shop platform a discussion on EURO was stimulated helping students realise the imminent changes with a real example, so that the importance of the introduction of a common currency was understood in a clear self discovery process.

An innovative moment of the AgroWeb project was the use of the Internet not only as information tool but as an instrument to help students practice transnational marketing and commerce. Through the creation of a virtual classroom the students had the chance to actively participate on the electronic AGORA, marketing European agricultural goods through the AgroWeb's e-shop. The Internet in the AgroWeb project, through the development of the suitable platform was used as communication tool for collaborative learning. The exchange of content between students of different European schools like the exchange of content on the agricultural products including cultural and geographical details stimulated collaborative activities like the design over distance of a common marketing strategy for different European goods.

Moreover, innovative was the interdisciplinary approach not only by means of connecting learning processes of various disciplines as geography, mathematics, new technologies, economics etc. in the common framework of one project. Project Agro Web's methodology also connected non technical activities as the planning and implementation of a marketing and distribution policy safeguarding sustainability of agricultural products making use of ICT tools, thus creating bridges between tradition and new technologies in modern life.

The AgroWeb project targeted at a long term effect on students' behaviour as active players on the European market. This was achieved in the project by transmission of skills and critical knowledge to face the challenge of ICT practices in today's and even more tomorrow's daily life of European Citizens, including the motivation to constantly up-date their knowledge and to accept life-long learning. Particularly students involved in the project acquired **tele-working** experiences, organizational and management skills that are key competencies for tomorrow' s European workers. The "AgroWeb e-shop" itself as sustainable outcome of the project may be maintained as a well functioning e-commerce tool by interested parties after the project's ending.



CHAPTER III

EVALUATION AND MONITORING OF THE PROJECT

3.1 General objectives of the evaluation

From an educational point of view, the Agroweb project was designed to enrich the learning environment of the classroom and thereby facilitate the learning process with respect to different aspects:

- Through the stimulation of interactions among pupils and between pupils and teachers, learning should be experienced as a collaborative process.
- The high degree of participation should increase pupils' interest in the subject matter as well as in self-guided learning; this higher interest should also lead to a higher degree of acquired knowledge related to the topics of the project.
- The international character of the project should raise a sense for specific cultural characteristics of the partner countries.

Guided through these general objectives of the project the (quantitative part of the) evaluation focused upon four different main aspects:

Social / intercultural attitudes: The high degree of collaboration and the international character of the project lead to the expectation that social attitudes should change towards a higher appreciation of teamwork as well as a higher degree of acceptance of and knowledge about persons from foreign countries.

The use of new technologies: Furthermore it was hypothesized, that the experiences made in the classroom concerning the use of modern technologies would lead to a change of the own behavior in a sense, that the participants of the project would use specific electronic tools more consciously (i.e. more or less often).

Knowledge about Europe: Through the international character of the project it was furthermore assumed, that the knowledge about other European countries, specifically those who also participated in the project would improve.

Electronic commerce, security of transactions and electronic payment: In addition to that an improvement of the knowledge concerning specific aspects of e-commerce was expected.

3.2 Methodology

The project's evaluation was based on the combination of quantitative and qualitative data in order to overcome difficulties associated with the relatively small number of students involved and the limited duration of the implementation of the project in classroom, which is the case for such educational pilot projects.

3.3 Quantitative Evaluation

3.3.1 Test design

In order to evaluate the above mentioned expectations a quasi experimental design with control and experimental groups and pre- and post tests was adopted. A two group design was selected.

	Control group	Experimental group
Pretests	x_{11}	x_{21}
Posttests	x_{12}	x_{22}
Expectation	no change	change

This can be considered the strongest design to test effects that are due to the treatment - the participation in the project - in con-

trast to other factors, e.g. by aging of the participants. The statistical tests examine the interaction between the dependent time-factor (changes from pretest to posttest) and the independent group factor (experimental versus control group). The results that were obtained after the implementation of the project can be summarized in three different categories: a) no effect: in this case there was no change in the behavior or the knowledge of both the experimental and the control group b) main effect: both the experimental and the control group changed their behavior towards the same direction c) interaction effect: the experimental group improved its behavior whereas in the control group no changes occurred. Ideally one finds a change between pre- and posttest in the experimental group and no change in the control group.

Moreover the project's team decided to adopt a complementary test design in order to additionally compare the different types of schools that participated in the project (conventional and technical schools) . The question of interest in this case was the comparison of differences between pre- and posttest (time effects) between conventional schools and technical schools. Different time effects of the two school types indicate different adaptation processes as described below.

	Conventional schools	Technical schools
Pretests	x_{11}	x_{21}
Posttests	x_{12}	x_{22}
Expectation	time effect 1	time effect 2

3.3.2 Data acquisition

The main data source is a **questionnaire** which has been developed according to the project's general objectives. It consists of 14 partly multiple items, respectively of 66 single items.

Qualitative self-reports, made by the schools about the experiences developed during the project were used to give additional information to specific questions.

3.3.3 Statistics used

For the two different kinds of data used, different inferential statistics have been applied to determine significant effects:

1. Ordinal data, i.e. data that indicate a higher extend of the phenomenon examined by a larger number (e.g. 35 degrees air temperature is warmer than 20 degrees): These data were examined with a Multivariate Analysis of Variance (MANOVA) with one

dependent factor "time" (difference between pre- and posttest) and one independent factor experimental and control groups or "school type" (conventional versus technical schools).

The MANOVA has actually been developed for interval data, i.e., data of a higher quality than ordinal data. However it has been shown in several simulation studies that it is quite robust even if its prerequisites have not been met completely. There are only few statistics available for the comprehensive analysis of test designs like the one used here, which are also more conservative, i.e., require larger samples in order to be able to detect effects. For these two reasons the MANOVA has been chosen.

2. Categorical data that indicate different categories of phenomena with different numbers (e.g. 1 = "yes", 2 = "no"): Categorical data were examined either with a Chi-Square test or - mainly - with a McNemar test for symmetric tables with pre-and posttest data.

A significance level of 10% (alpha < 0.1) has been selected to accept a result as statistically significant.

3.3.4 Instruments

The evaluation was performed through the use of a questionnaire (Annex 1), that was applied at the beginning of the test run and at the end of the final run. The questionnaire was written in English and it was divided into four main topics:

- social and intercultural attitudes (Questions 1-3),
- the use of new technologies (Questions 4-6),
- knowledge about Europe (Questions 7-9) and
- electronic commerce, security of transactions and electronic payment (Questions 10-14).

3.3.5 Sample description

The sample used for the analysis consists of 283 pupils who participated in the pre test and 200 pupils who participated in the post test.



Participants in Pre test:

Place	
Frankfurt	14
Schwechat	57
Athens	56
Serpa	28
Velje	51
Michelstadt	51
Thessaloniki	26
TOTAL	283

Participants in Post test:

Place (2)	
Frankfurt	15
Schwechat	30
Athens	56
Serpa	26
Velje	32
Michelstadt	25
Thessaloniki	16
TOTAL	200

The sample used for the second part of the analysis -between the two different types of schools- consists of 68 pupils in the experimental group who took actively part in the Agroweb project. Out of the 68 pupils 46 pupils stem from conventional schools whereas 22 from technical schools. Although the gender distribution does not appear to be even - the proportion of male to female pupils is higher in technical schools - the statistical test shows these differences as not significant (Chi-Square, p=0.151; one value in the category "technical schools" is missing)

Sex versus School type

		School type		Total
		conventional schools	technical schools	
Sex	female	24	7	31
	male	22	14	36
Total		46	21	67

The two samples differ however with respect to the age of the pupils (here measured at the time of the pre test):

Report

School type	Mean	N	Std. Deviation	Minimum	Maximum
Conventional schools	15.54	46	1.95	14	22
Technical schools	17.77	22	0.95	16	20
Total	16.26	68	1.98	14	22

Pupils of the technical schools were older than pupils of conventional schools (ANOVA, p=0.00; please also note the differences in the standard deviations: the age of the pupils in technical schools centers more around the mean of 17,77, whereas the distribution of the ages in conventional schools is wider).

For the further analyses it has to be noted, that differences in school type are confounded with differences of the age of their pupils.

3.4 Quantitative Analysis

As it is described in the first part of this chapter, the questionnaire is divided into four main topics: Social and intercultural attitudes, the use of new technologies, knowledge about Europe and electronic commerce, security of transactions and electronic payment.

The most interesting questions from each topics are discussed below.

3.4.1 Social and intercultural attitudes

The interest in information about foreign cultures has slightly decreased in both the experimental and the control group (Figure 1). The interest in information about foreign cultures has slightly increased in technical schools and decreased in conventional schools during the project (Figure 2). Concerning these quantitative results, it is generally admitted that in ODL, the social

parameter is weaker compared to the other components, and do not play a central role in students interests. The fact that this socio-cultural interest increases in technical schools and decreases in conventional schools is probable due to the general curriculum of last ones and pupils previous knowledge on the subject.

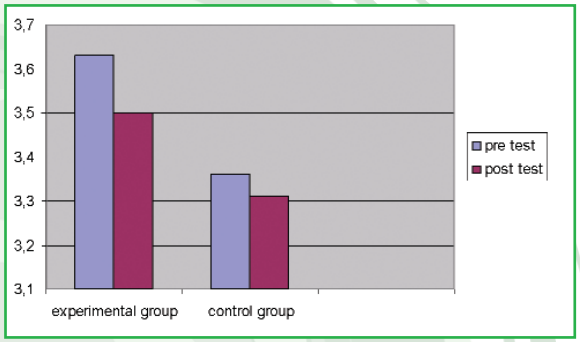


Figure 1 : "How much are you interested in information about foreign cultures? "

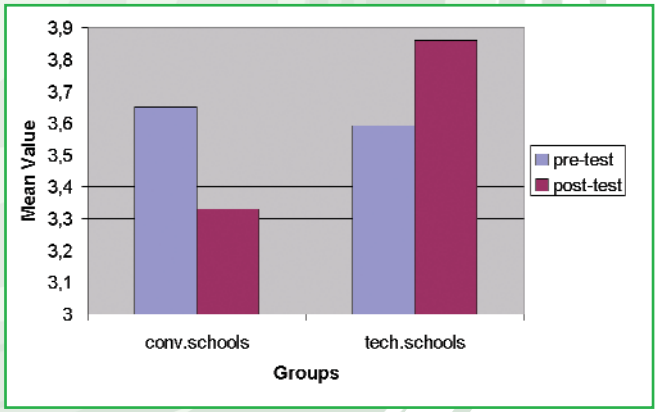


Figure 2 : "How much are you interested in information about foreign cultures? "

The promotion of the team work was one of the main aims of the project. According to the quantitative results of the evaluation there was a progress in students' attitude towards collaborative learning and teamwork. The positive attitude towards collaborative learning and the desire to work together in groups is of great importance, especially for the ages that the project addressed to. Concerning homework in collaboration with others, pupils in both the experimental and the control group work more in groups after the project's implementation (Figure 3). Concerning the same question pupils in technical schools work more in groups than conventional schools but there is no significant difference between them.

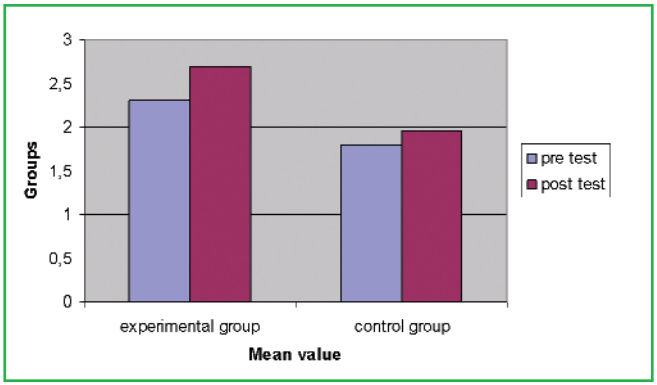
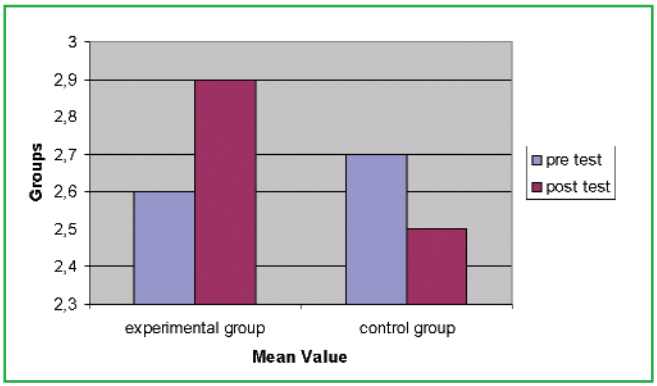


Figure 3: Do you usually do your homework with other pupils?



However, results concerning group-work related to the realization of projects become more significant, since in fact pupils from the experimental group work more often with other pupils than pupils from the control group (Figure 4). Moreover groups from both conventional and technical schools work more often with other pupils at the end of the project (Figure 5). This result is encouraging because it shows a positive change to students social behaviour, and consequently ODL can be considered as one promising tool to accomplish this objective.

Figure 4: Do you work on projects with other pupils/friends?

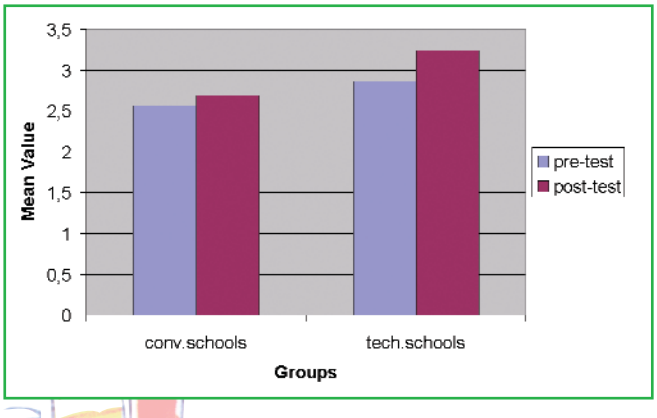


Figure 5 "Do you work on projects with other pupils/friends ?"

3.4.2 The use of new technologies

Quantitative analysis of the results reveals that students of both groups are significantly less interested, to use new technologies and internet at the end of the project , and to participate in European projects (Figure 6). In contrast, we did not observe any important difference between technical and conventional schools for these two questions.

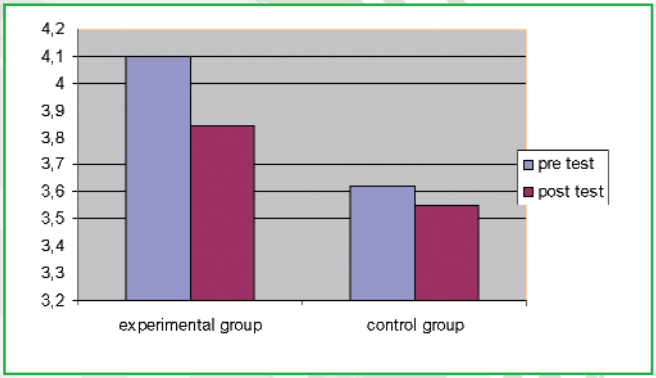


Figure 6: How much are you interested in New Technologies / Internet?

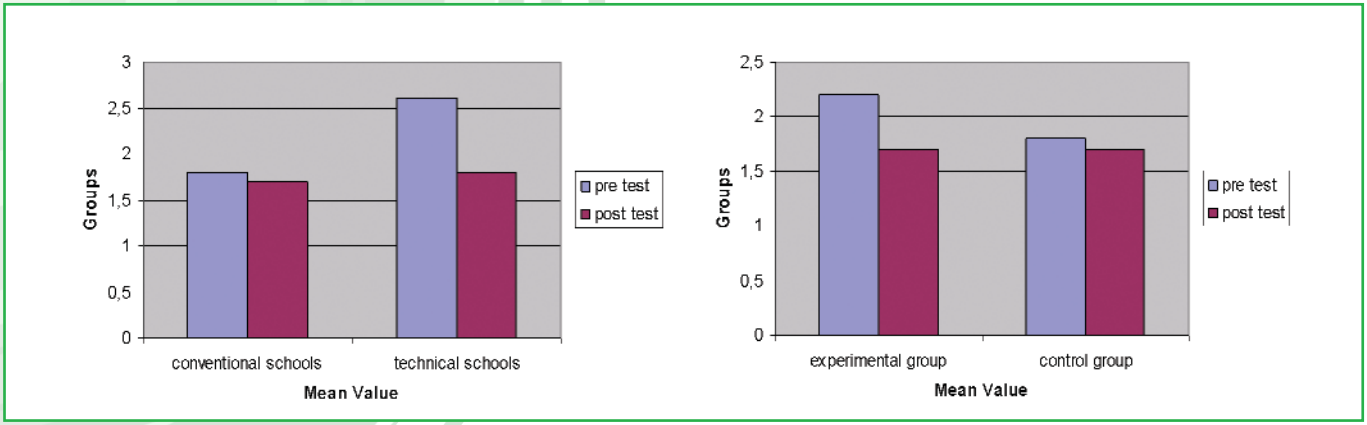


Figure 7: "How much time did you spent at your PC during the last two weeks with games?"

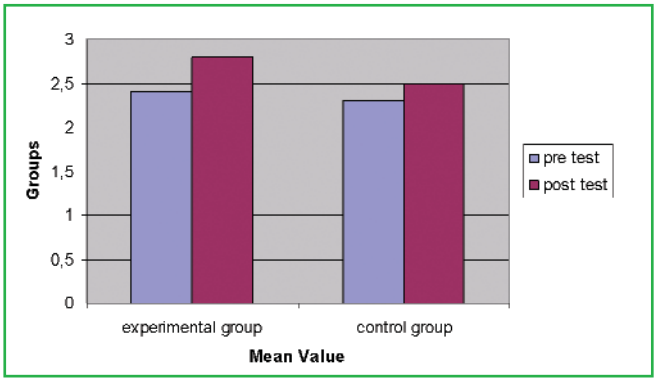


Figure 8 : "How much time did you spent at your PC during the last two weeks with word processing ?"

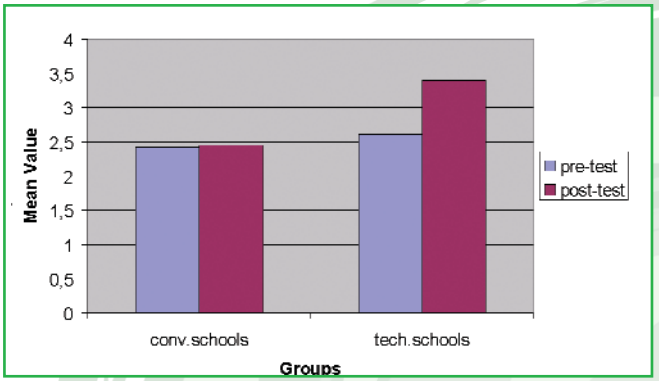


Figure 9 : "How much time did you spent at your PC during the last two weeks with word processing ?"

On the use of computers at home, at the end of the project, both groups -experimental and control- spent less time with games (Figure 7) and more time with other activities related to computing, in particular word processing and data analysis (Figure 8). This effect also concerns the comparison between conventional and technical schools (Figure 9). However it is still stronger for technical schools. All these results strengthen and encourage one of the main aims of the project to incite pupils to use computers rather as a tool for intellectual work than as a game machine or a source of entertainment in general.

For the use of Internet at home, participation to the project has no direct effects to many activities related to the access and use of the web. Especially, this concerns the time spent for internet games, use of emails, chat, forums, discussions with other schools, visiting e-commerce sites or designing web pages. This is not so surprising since students of today, have a very good idea of Internet, and they are already familiarised with its use. Pupils in the experimental group spent more time than pupils in the control group in visiting educational sites for homework and in communicating through email Technical schools spent more time than the conventional ones for communicating with other schools via the net or tourism information. In contrary conventional schools spend more time for visiting educational sites in order to prepare homework. This confirms -as previously, the fact that ODL projects help pupils to consider Web rather as a source of useful information or a communication tool than a source of entertainment.

3.4.3 Knowledge about Europe

One of the aim of the project was the acquisition of knowledge and skills on subjects such as economy and agricultural production of the countries of the European Union. For the knowledge of European currencies, -although today with the arrival of EURO the subject has only historical sense, there was a positive change concerning the experimental group whereas no change has been recorder concerning the control group. A significant positive difference was only found for conventional schools but not for the technical schools . We also observed that pupils of both groups had a much better performance to write the equivalence between one EURO and the currency of their own country.

The last theme of this group of questions concerned the agricultural production (wine, corn, beer etc.) of each country. Here the main goal is to see if the project may have some effect on the knowledge of pupils on the subject. The following table contains the answers of pupils at the beginning and the end of the project (pre- and post-tests) for the first preference item per country.

Country	Schools	First choice item pre-test	First choice item post-test
Finland	E	Salomon	Salomon
	C	Salomon	Salomon
France	E	wine	wine
	C	wine	wine
Greece	E	olive oil	olive oil
	C	ouzo	ouzo
Portugal	E	oranges	oranges
	C	wine	grapes
Spain	E	oranges	oranges
	C	oranges	oranges/olive oil
Germany	E	beer	beer
	C	beer	beer
Austria	E	Chocolate	Milk
	C	Milk	corn
Italy	E	spaghetti	spaghetti
	C	spaghetti	spaghetti
Belgium	E	chocolate	chocolate
	C	chocolate	chocolate

Table: The first choice item per country during pre-test and post-test for experimental and control group(E: experimental group , C: control group)

Following this table we see that unless some minor exceptions there are no significant differences between experimental and control groups (unless Greece, Portugal and Austria), on one hand, and between pre-test and post-test, on the other hand (unless Portugal, Spain, and Austria). Moreover no significant change was observed between conventional and technical schools.

3.4.4 Electronic commerce, security of transactions and electronic payment

This part deals with one of the central subjects of the project, i.e., questions about possible type of items to order via Internet, security and payment issues, design of web sites and elementary knowledge on commercial economy.

Concerning types of items to buy on the web, it seems that pupils in the experimental group at the end of the project used the Internet more often than pupils in the control group in order to buy different kind of items. (Figures 10,11). It has to be noted that students in the experimental group were enhanced to use Internet in order to buy agricultural products whereas no such influence was addressed to students in the control group. For that reason it was expected that students in the experimental group would use Internet more often than students in the control group in order to buy agricultural products. However according to the quantitative analysis of the data students in the experimental group used the Internet more often than students in the control group in order to buy different kind of things. This observation is of great importance as it shows that AgroWEB project had a positive influence in students attitude towards e commerce. Concerning this matter no significant difference revealed between technical and conventional schools (Figures 12, 13).

These encouraging results show that Agroweb project reinforces pupils to consider Internet, not only as a communication tool or a source of useful information but also as a daily service, in other words, web becomes a style of life.

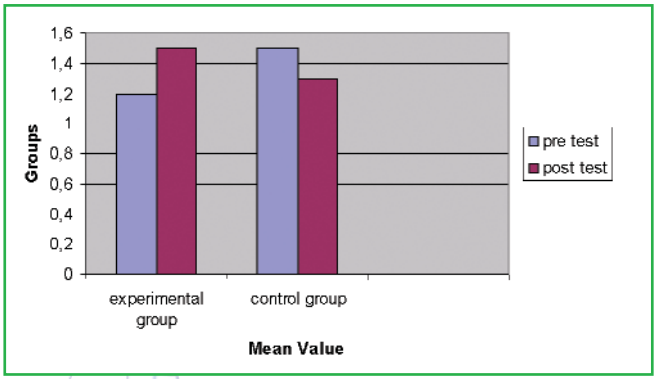


Figure 10: "During the last two months how many times have you bought tickets for theatre/ cinema via internet ?"

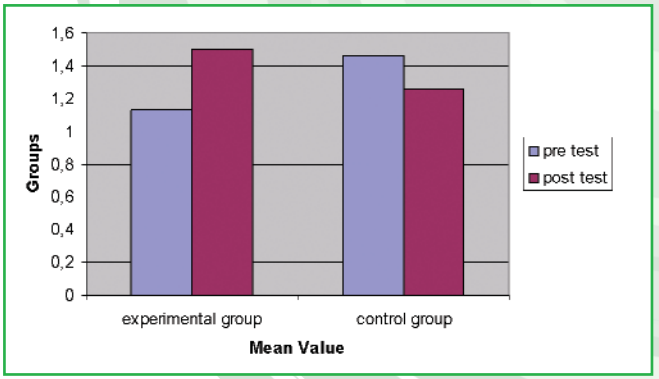


Figure 11: "During the last two months how many times have you bought agricultural products via Internet?"

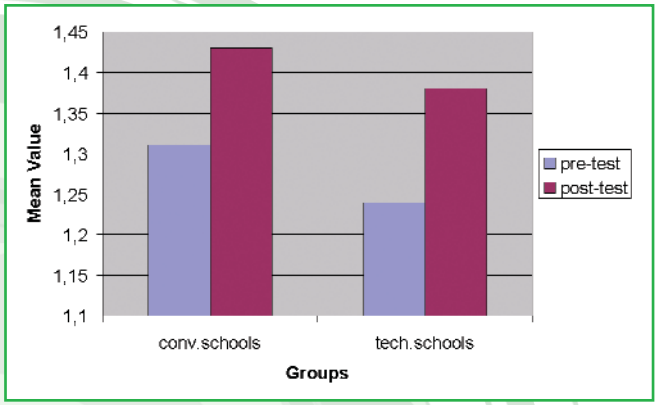


Figure 12: "During the last two months how many times have you bought tickets for theatre/ cinema via Internet?"

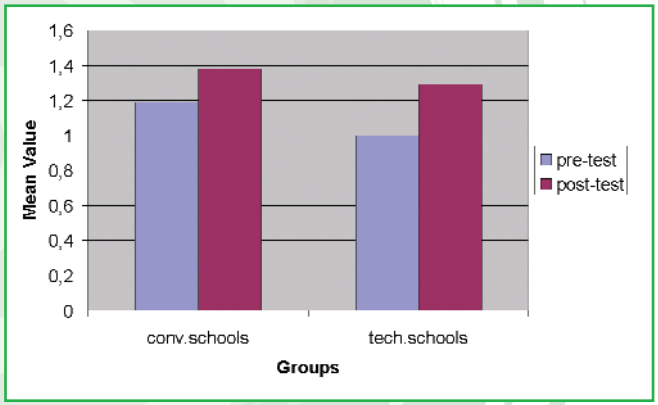


Figure 13 : "During the last two months how many times have you bought food/agricultural products via Internet ?"

Let us now discuss the second theme of this part, i.e. security related to Internet. These questions arise very often in daily life since paying on line became of common use last years and is still increasing considerably. In such a context, the first element to take into account was to evaluate the general (and probably not well justified) opinion of pupils on the question that if paying through internet is secure or not. Pupils from both the experimental and the control group seem to believe that Internet is rather not secure, whereas no significant change was observed after the implementation of the project. On the other hand technical schools shifted, after the project's implementation, towards the assumptions that paying is secure (with a big number changed from no to yes and nothing from yes to no), while conventional schools did not follow some explicit direction. Another point is that, although, pupils have already formed an opinion that internet is rather not secure, they reveal many difficulties to explain why internet is not secure. The three possible causes proposed in the questionnaire (the merchant might cheat, network is not secure, computer is not secure) seem to have no direct effect. This probably is due, in one hand, to the fact that pupils have neither experience nor knowledge on the subject and, on the other hand, ODL projects they do not touch

such technical aspects of mathematical flavour and therefore do not help directly pupils to form some opinion.

Another activity of e-commerce concerns the conception and design of commercial web sites. This part of the global activity plays a crucial role, since the web pages constitute the unique interface between merchant and client. The way of designing the pages defines the contact (bad or good) between the interested parts and influences the success of the commercial operation. For these reasons it seems interesting to see how the project interacts within this activity. Following the results, we observed substantial increase of performance for the experimental group and decrease for the control group (Figure 14). Furthermore conventional schools had a better performance after the project's implementation whereas we observed a decrease in the performance of the technical schools. This seems surprising for technical schools, but a first explanation maybe based on the fact that pupils already had acquired different and correct knowledge for web design through their curriculum and the project influenced in the bad sense. It should be interesting to explore the different interacting factors and clearly further study has to be done at this point in the future.

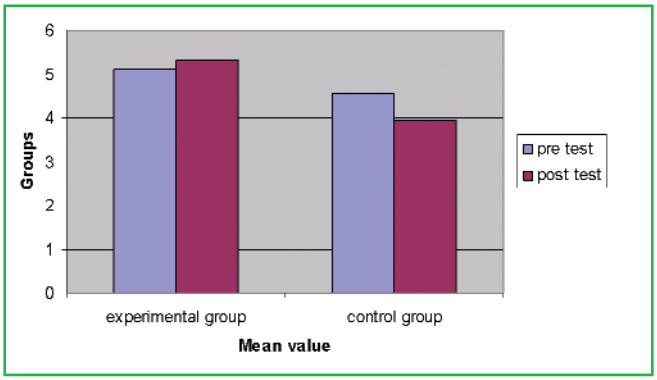


Figure 14: Create an Internet site - correct steps

The last part deals with basic knowledge on commercial economy where elementary concepts like seasonal sales and benefits are approached. The obtained results reveal no significance, for the choice (based on related graphics) of items to sell for both groups. For seasonal sales, tendency shows a slight improvement for both groups but once more there is no significance.

3.4.5 Conclusions

In the society of today teachers and students have to deal with a considerable amount of information coming from diverse and heterogeneous sources. In such a quite new context, ODL projects play a crucial role in the sense that they permit to touch many different reference domains. The school of today has to offer not only formal but also informal knowledge while students must be prepared not for the acquisition of the information but for the fast and efficient treatment of the useful information. With the arrival of new technologies, the teacher consider the acquisition of knowledge like a process of continuous research where he has to share with its students the difficulties and the results. In addition, globalisation with its full and rapid social impacts needs educational tools which can permit international contacts and experiences already at the school level, but which

at the same time, preserve and promote local particularities and characteristics.

Clearly Internet and ODL projects like Agroweb seem very promising tools for accomplishing the above objectives and help to pass from the industrial society to the information society. However, a very careful evaluation is needed each time when changes are involved in order to measure from a psychological and educational point of view the impact of these changes and define some formal directions to follow for the development of the content of the information highways. Without such a guidelines Internet may become the horse of Troyes for next generations.

In the present pilot study, such an evaluation method was developed and applied. The conclusions of that evaluation are rather uncourageous since the quantitative analysis of the data showed that Agroweb played entirely its role and satisfied almost all objectives.

3.5 Qualitative Evaluation - Observations

Qualitative analysis typically includes content analysis, analysis of case studies, inductive analysis and logical and sequential analysis. All methods may produce descriptions interpretations and explanations of these patterns. The data analysis should include efforts to assess the reliability and validity of findings.

The analysis of qualitative data help broaden the view of the phenomena of interest in an evaluation, but can also increase depth and detail, where needed. The process of analysing qualitative information is often inductive and without any particular guiding theory.

In the framework of the AgroWEB project the qualitative analysis was based mainly on field observations. Fieldwork is the central activity of qualitative data gathering. To be in the field means to have direct, personal contact with people in their own environments. It is the researcher's desire to contextualize program or product implementation that allows him/her to capture important "results" (effects, outcomes) that standardized measures cannot.

Agroweb was based on a new approach for teaching themes related to economy, marketing and other topics of the net economy. In particular it generated a micro-cosmos of "real life" situation in school, enforced pupils to have contacts with producers, getting orders via the net and take care of payment and the exportation of the products. In addition, it was created a virtual environment where students and teachers discussed and exchanged ideas continuously, and got familiarized with the use of new interactive ICT tools. In what follows the main achievements of the project are presented.

3.5.1 Interactions between students

In the most of the schools, tools were developed in order to facilitate virtual interactions and communication between students

(forums, web pages, etc.), organized open days, or visited and received partner colleges. Some schools used the Agora Internet for posting messages or Videoconference for on line communication. The number of Videoconferences organized was less than the expected due to the difficulty in finding an intersection time at which groups could be available. In addition the most of them participated to the exiting closing event in April 2002 in Athens.

Through such interactions, first of all, participation to the project developed "the spirit of team" since, in fact, students have become aware of the basic requirements for successful teamwork: reliability, a sense of responsibility, coordination. It became more obvious that the exchange, the pooling of knowledge is most efficient as no individual can ever be omniscient. In addition, students have gained an insight into the cultural diversity of other countries, and the reality of the Europe of today, e.g. the "European spirit team".

3.5.2 Interaction between students and teachers

During the realization of the project, it was experienced that teaching and learning are no opposites but complementary activities. It became more obvious that partnership between students and teachers requires the students' willingness to cooperate and teachers must offer them the chance to use their own initiative in both the in- and extracurricular activities In addition, Agroweb promoted lifelong learning, i.e. students must admit, and teachers have to teach that learning of today is an element of any individual's life independent of age or position. Finally, the fact that many parts of the project were done in addition to the regular school work, it was also proved that teaching and collaboration between students and teachers may be extended out of the school context, i.e. may have the status of an extra curriculum activity without causing any opposition from the students.

3.5.3 Information about European partners

The students have gained an insight into the cultural diversity of European countries from the individual home pages of the partner schools as well as the partner teams' presentations of and information about the local markets, producers and their products, about customs and traditions. In addition, they have experienced a sense of community with the partner teams sharing the ambition to establish the common e-shop, a miniature version of the Common Market, supported by the common currency, the EURO.

3.5.4 Attitude towards ICT and e-commerce

ICT European projects are a welcomed change to normal school life. Class spirit and level of student enthusiasm for this project was extraordinary while the most of them want to participate in any similar future projects. Some working steps caused a lot of motivation and activation, for further investment especially on the new technologies. To all of the students work on the project has given an impulse to widen their knowledge of computing, at various levels (web design, animations, software development, data bases etc.) of course, - depending on the individual starting points. As an example, one of the girls of the Freiherr vom Stein School, "the photographer", has developed an interest in creating computer animations as a fellow student has shown her how to use the proper software. Many others have searched the Internet for software supporting the design of a sophisti-

cated home page and have created their own personal home pages. In contrary, for questions concerning electronic payment and security, pupils are still reluctant since they doubt that the Internet is quite secure, and the delivery of goods can be a problem as experience has shown. Pupils have become aware of the logistics necessary for the proper distribution of the goods ordered, one requirement, among other aspects, for successfully running an e-shop.

3.5.5 Familiarization of pupils with the business world

The Agroweb project, enforced students to touch problems of the real business world life i.e. have contacts with producers, getting orders via the net and take care of the exportation of the products and payment requirements. With the students being at an age when they are confronted with the need to choose professional career, this personal contact with producers, businessmen, transport companies and payment establishments has been of great importance. The students have had to learn how to prepare a business plan, write a proper business letter, choose the appropriate marketing style, confront with customs and duty authorities, negotiate overdraft facilities with banks, register company with young enterprise, prepare products ready for fair and asking for eventual sponsorships. They have experienced the importance of considering the producers' expectations as to reliability, the keeping of appointments, efficient use of time, etc. They have become aware that owning and leading an even small business is a complex, responsible and huge task, involving personal commitment, considerable investment of money and time, knowledge about work organization and accounting, and human resources management. Getting to know the production processes in detail has alerted them to the cost and to the importance of sophisticated machinery in the production even of seemingly simple products, as for example apple juice or wine.

3.5.6 Impact on teachers

Although, the work on the project had been done in addition to the regular work of teaching, at the same time it has been extremely rewarding in more than one respect. The most obvious result may be that for the most of the teachers not only lost all reluctance as to computing but have come to use the computer and the Internet for school work in general. Even, several times students came to aid their teachers when the last ones could not manage the computer. Agroweb enforced the strong sense of partnership between students and teachers, the pooling of knowledge has been one rewarding experiences of their teaching career and has affected the approach to use students initiative and have an active part in class. From the teacher point of view, another innovative elements of the projects was the idea of having to explain multidisciplinary objectives, especially subjects like computer science, geography, arts, English, web design, economy etc.

3.5.7 School Innovations

Based on the experience with this project, in the most of the schools, it will be added to their curriculum new courses related to electronic commerce and web development that will be mandatory for business students, to be taken concurrently with the business planning course. School administrations had the opportunity to see the effects of integrating information technology with the curriculum and the enthusiasm generated from students and other faculty. They are convinced today that the Internet will become a major source of knowledge, and may be easily integrated as an additional tool in educational and scientific pro-

grams. Mrs. Reba Georgiadi, teacher in the Anatolia Farm School in Thessaloniki, pointed out that the AgroWEB project gave the school administration the opportunity to see the effects of integrating information technology with the curriculum

The AgroWEB project was very successful here, recognized as an innovative method of incorporating computer technology into the curriculum AND in giving the students first-hand experience with e-commerce webpage development. We (faculty and administration) are developing a new Marketing program concentration starting this year.Within the new Marketing concentration, we propose to include a continuation of the AgroWEB project as a full-semester course called "E-Commerce". The course has been approved and incorporated into the second year of the required studies for Marketing majors (this includes over 50% of our enrolled students this year!). The students will have had the one-year computer studies courses (including webpage development), so we feel they will be ideal candidates for an advanced study of e-commerce and a practical exercise in e-commerce webpage development along the lines of AgroWEB. We have an annual "May Day" fair at the American Farm School campus. Students will be able to display their webpages and sell the products (much as Ellinogermaniki Agogi organized the product fair last spring).We consider this course as following in the tradition of the Farm School to provide realistic, hands-on practise and application of business and agricultural theory; the AgroWEB project was instrumental in the planning and design of this course.

R. Georgiadi, American Farm School

In the long term, the Internet may replace or complete the conventional school books, while there are signs that such innovation may increase the students' interest even for traditional classes, as for example in Geography, a subject that seems particularly effective as one of the schools' tasks is to broaden young people's horizons, to improve their knowledge and understanding of the countries of the world.



CONCLUSIONS

ICT and ODL in education, higher, superior, even primary are the challenges of schools of today in the way to the school of tomorrow. Much more than a stream of fashion, they represent for actors in education the new trends all around the world.

However, they cannot be introduced in everyday school practice without the appropriate preparation. They had better reach school classes in the form of educational projects well- planned, interesting, motivating and of course tested.

After the determination of the pedagogical framework of the projects (the main didactical and pedagogical approaches), their appropriateness for the specific age groups, the learning objectives of such projects; after the preparation of teachers for such attempts with the theoretical and practical background needed in order to implement ODL and ICT in their everyday classrooms; finally after the creation of the available "space" in the curriculum for this kind of activities, even if there should be a complete reshaping of the school curriculum that needs to be done; after the evaluation of the activities, their learning value and the response of students to them, one can argue that ODL and ICT have come in the school world neither as a threat to the conventional ways of teaching, as a substitute to it, nor as an element aiming to create impression, but rather as an add-on having justified its introduction through the qualitative upgrade it offers to the everyday teaching practice.

Educational projects and in general actions - and actors- in education have to be systematically evaluated. They have to meet the educational aims they set right from the beginning; otherwise they should be revised or even replaced by more efficient practices. After their successful implementation and the evaluation results, these projects and/or actions should be expanded in more school environments as suggestions for interesting, interdisciplinary activities proposed to teachers and students wishing to learn by doing, to learn in a pleasant way things that are necessary to the citizens of today and what is most important, to the citizens of tomorrow.



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Appendix 1

Agroweb - Pupils' questionnaire

School:	Class: EG ( ) / CG ( )
Name: _____	
Sex: female ( ); male ( )	Age: _____ years

1) How much are you interested...	not at all	very little	little	much	very much
... in new technologies / internet					
... in information about foreign cultures					
... to have contact with foreign students					
... to participate in European school-projects					

2) Do you usually do your homework with other pupils ?

never	rarely/ occasionally	often	very often

3) Do you work on projects with other pupils/friends ?

never	rarely/ occasionally	often	very often

4a) Do you have a PC at home ?

Yes	No

4b) If yes, how much time did you spent at home at your PC during the last two weeks with the following activities:

	Less than 1 hr	1-2 hrs	2-3 hrs	3-5 hrs	More than 5 hrs
Games					
Word processing					
Painting, drawing					
Data analysis					

5a) Do you have Internet access at home?

Yes	No

5b) If yes, how much time did you spent at home at your PC during the last two weeks with the following activities:

	Less than 1 hr	1-2 hr	2-3 hrs	3-5 hrs	More than 5 hrs
Internet: games / entertainment					
Internet: other schools					
Internet: tourism information					
Internet: educational sites for homework					
Internet: e-commercial sites					
E-mail					
Web-page design					
Chat					
E-commerce					

6) Can you use a PC at your school at any time (not during lesson hours) ?

never	rarely/ occasionally	often	very often

7) In the left table there are different European countries and in the right different European currencies. Match each country with its currency. To do so write the corresponding number of the currency in the box next to each country.

Italy		1	Drachme
Austria		2	Franc
Portugal		3	Escudo
Denmark		4	Pesetas
Holland		5	Mark
Spain		6	Schilling
France		7	Lira
England		8	Livre
Greece		9	Krone
Germany		10	Florine

8) Write the equivalence between one Euro and the currency of your own country.

1 Euro =



9) In the left table there are some European countries and in the right one there are some European products. For each country assign one to three of the most significant products. To do so write the number of the product in the corresponding boxes of each country. The same product may correspond to many different countries.

France		1	wine
		2	grapes
		3	olive oil
Greece		4	beer
		5	corn
		6	oranges
Portugal		7	saussages
		8	olives
		9	cheese
Spain		10	watermelon
		11	butter
		12	ouzo
Germany		13	potatoes
		14	spaghetti
		15	milk
Austria		16	mustard
		17	salmon
		18	chocolates
Italy			
Finland			
Belgium			

10) During the last two months how many times have you bought the following items via internet?

	0	1	2	3	4 or more
Tickets for theatre / cinema					
Tickets for plane / boat / train					
Books					
Food / agricultural products					
Clothes					
Games					
CDs					
Other items					

11a) Do you think that paying through internet is secure?

no	yes

11b) If you checked "no" in the above question: Why is paying through the internet not secure? (multiple checks allowed)

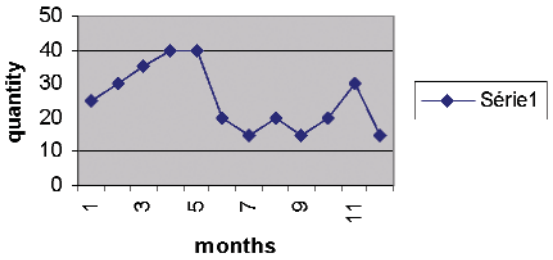
The merchant might cheat	
The network is not secure	
The PC is not secure	

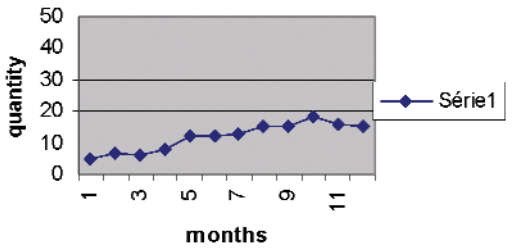
12) Identify the correct order to the subject "create an Internet site and sell agricultural products ", and indicate it with numbers from 1 to 10.

	Design attractive trademarks and Web pages for the products
	Send the products and bill the customers
	Select the most appropriate products to promote and sell
	Promote the products over the Web site
	Monitor the products' performance regularly and modify the business plan accordingly
	Develop the Web site for the promotion of the products to sell
	Sell the products via the e-shop
	Receive the payment
	Collect information about the products
	Develop a business plan and define prices for the products

13) In the followings graphs you can see the results of one year of sales concerning items X and Y. The price per unit of item X is 5 Euros and the price of Y is 10 Euros. If you had to decide, which one of the two products you would continue selling for another year, which one would you choose?

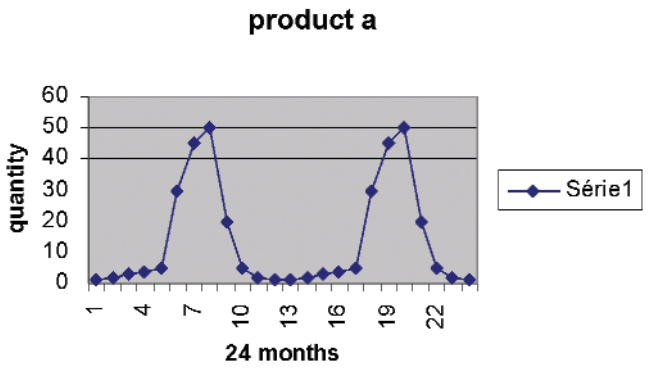
Product X	Product Y





14) In the next graph we present the sales of one product over a period of two years. What is the particularity of this product ? Please choose the most likely one (one answer only).

- not expensive during May and October	
- high popularity/good image	
- seasonal product	
- we do not know	







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Education and Culture

Ellinogermaniki Agogi