THE CONTEMPORARY INFORMATION TECHNOLOGIES IN THE SERVICE OF THE PRIMARY AND SECONDARY EDUCATION: THE CASE OF GREECE

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Abstract

The introduction of technology in general and especially information technology in education is a big change in the educational concepts which has taken place during the last two or three decades all over Europe. Besides, Europe through the process of continuous education improvement tries to maintain maybe the unique but also so much decisive comparative advantage that it possesses against all the other countries of our planet that is nothing else but the quality of its human potential. This article presents with brevity the important steps that the main European countries have made in the introduction of modern technologies of information technology in the primary and secondary education, as well as the process and the problems of their introduction in the Greek school. We believe that this experience will be very useful in a country like Lithuania that has already made very important steps in this sector simultaneously with its successfully continuing transition in the market economy system.
Key words*: educational technology, e-learning, information and communication technologies, information technology, primary and secondary education.*

Introduction

The E - Learning constitutes a new and rapid developing region in education, focused in special educational needs. It is used in order to describe education methods, such as e-learning education, internet based education, virtual teaching rooms, with common element the use of telecommunication technologies as the means between the instructor and the trainee. It is strictly depended on the rapid transformation of the teacher-educator into instructor, something that could be a big comparative advantage of the European area compared to other regions of our planet. Nowadays an increasing investment tendency in a lot of E-Learning education initiatives is observed.

The e-Learning makes a real revolution in the educational sector. It is an alternative training method with a professor in class that gives us access to the educational material 24 hours a day, 7 days a week through the Internet. The content of educational material (courses) is in the form of Multimedia, that is to say, not only text, but it is also presented with the form of sound (audio), video and other means of interaction, checking and evaluating the study, the yield and the degree of assimilation of the knowledge of the trainees.

The trainees have the possibility of communication with the Professor and their classmates via Asynchronous Communication (Asynchronous Mode) or Modern Communication (Synchronous Mode - Virtual Classrooms). The "Virtual room of teaching" is composed of solutions of queries by the Professor, exchange of opinions among trainees, trainee participation in Discussion rooms, chat rooms, news groups, and live sessions.

With the term e-learning we mean the distance learning in which electronic means are used exclusively, both for the development of courses and the accompanying educational material and software as well as for the communication and collaboration with the instructors or the other trainees.

E-learning is the total activity of a student, who is educated and learns - while he is away from his teacher - based on a specifically drawn training material, as well as on his communication with the professor.

Distance teaching is the activity of the educational institution that provides studies from distance and particularly of the creators of educational material and the instructors.

E-learning, is the offer of education with the following main advantages:
✓ Adapted to the needs (mainly professional) of the trainee.
✓ Accessible all 24-hour via Internet or Intranet.
✓ With the possibility of on-line collaboration via virtual classrooms so between the instructor and the trainee as well as among the trainees.

Three different forms characterize the contemporary distant learning:

1. *The self-paced training.* In this case a combination of educational materials (books, reports in the network, videotaped courses, notes, programs of learning based on computer etc) are offered to the trainee, they are usually separated in units (courses), which the student uses at his own pace, that is to say the students themselves decide when and where they will be used. There is no communication between the teacher and the other students.

2. *The Asynchronous remote learning.* This case is similar enough to the previous one. The participants have the possibility to work with the teaching material anywhere and whenever they want, having at the same time the possibility of asynchronous communication with both the rest of the participants and the instructor. It is not necessary to give all the teaching and general educational material from the beginning of course but it can be gradually offered to the trainees. The instructor in collaboration with the trainee determines the pace of conduct.

3. *The Synchronous remote learning (tele-education).* In this case the lessons take place regularly but the students and the professor can be in different places and by using technologies of videoconference they can all be in a virtual classroom of teaching. The lesson takes place in such a way that it offers the same or even more possibilities as those which take place in a regular classroom.

It is believed that tele-education technologies can be used only in academic places and they can be included only in the existing process of education. This impression is obviously wrong. Tele-education gives a perfectly different dimension to the significance of learning. With the use of tele-education the trainees save precious time of transportation and are given the flexibility to choose by themselves the time, which they will dispose. For this reason it can be widely used both in the primary as well as in the secondary education, specifically in countries with difficult morphology of territory such as Greece.

All the factors above make tele-education attractive in the operational place as well. The trainees can take part in seminars and continue their education without wasting time in transportation. The enterprises show intense interest in such technologies since they offer their executives the possibility of continuous education at a small cost.

Demands for the Materialization of E-Learning

As it was mentioned above, in order to make feasible the realisation of a lesson via tele-education the virtual classroom must offer at least all the possibilities that a regular classroom offers:

✓ *Electronic Board*. The board is the most important means that teachers use in the classroom. Therefore, it is important that the teacher in the virtual classroom is given this possibility too.

✓ *Interactive (double ways) audiovisual communication among the participants*. It is very essential for the success of the lesson to be a very good communication among the participants in order to eliminate the distance and to create the impression that they are all in the same place. Obviously, priority is given to the sound but the necessity of video should not be underestimated, since it has been proved that when the quality of video is lost, the interest of the participants is lost too.

✓ *Possibility for application sharing*. It is essential for the instructor to be able to present digital material to the students (power point presentation, web browser, word document, etc). As in the typical classroom the professor has the possibility of showing transparencies to the students, it is essential for the professor to be able to present the material of the lesson in the virtual classroom, too (power point presentation). With this possibility the students are also given also the opportunities to learn an application through tele-education.

The above requirements are the least ones that a virtual classroom should have. However, since advanced technological possibilities are offered to the professor, he can exploit them in order to enrich his lesson with other elements too. Eg.

- Video projection.
- Simultaneous navigation to network sites.
- Utilization of more applications apart from applications for presentations.
- Utilization of simulation programs. In this way virtual laboratories can be realized.

On the whole, the professor must be able to speak and move naturally, as he would do in a traditional lecture. He should not deal with the technical side of the systems, so that he can focus on the subject of the lecture itself.

Why Do We Have to Introduce Technology in Our Schools?

The introduction of the technology has the following basic advantages:

1. *The communication of teachers is facilitated*.
- Through the e-mail and the expert teaching lists e.g. all the biologists can tell their pain, exchange ideas, tests.
- Through discussion teams.
- Through especially shaped pages that facilitate the professor's opinions exchange worldwide.

2. *The creation of a community is possible*.
- The teachers are not isolated – the distances are eliminated
- They discuss about their work, the challenges they face
- They exchange experiences
- They support each other

3. *Access in inaccessible information is possible*.
- Possibility of search of all thesis
- Search in 5 dictionaries at the same time
- Search of subjects in newspaper files

- Search of work of art
- Virtual tours in museums

4. *The possibilities of teaching are improved.*
- Multiple representations
- Organization of information in hypertexts
- Inventive texts
- Individualisation of teaching
- Support of the student during the process of learning

5. *New strategies of teaching are supported.*
The diathematic approach:
- It is imposed because of the turn to the resolution of authentic problems.
- It is facilitated because of communication. Co-cooperativeness.
- It is imposed by the needs of the labour place - over-specialization
- It is imposed by the presence of computer laboratory.
- It facilitates the training process

6. *The productivity of the professor is improved.*
- The computers are ideal to processing and recovery of data
- The time-consuming work, class records, files of subjects are accelerated
- He can focus his attention on the analysis of data
- He can be informed about the progress of his science

Historical Retrospection

The term Information technology in Education declares the use of the Computer science as a tool to the teaching and learning of various objects. The use of Computer Study in education presents inexhaustible applications. It can be used as an aid to the teaching of all the objects. It can replace the most expensive audiovisual means and the libraries, thus decreasing the gap of material and technical infrastructure among the schools of various regions. It can remove a big weight from the work of evaluation. It is irreplaceable for the growth motive and intellectual dexterities, particularly to people who need special education.

In the introduction of new technologies and information technology in the primary and secondary education, we can distinguish three important stages or phases of introduction (G. - L. Baron, E. Bruillard, 1996):
- the information technology approach (1970-1980),
- means – object of education (1980-1989)
- the technologies as a means (after 1990).

The first phase is characterized by experimentations and researches in the level of junior and senior high school, life long training of teachers, software of pedagogic research and old type, hard to use and expensive computers.

The second phase is characterized by development promoted by the state in the primary school, junior and senior high school, life long training of teachers, production of software of the state and computers of various types (Apple, IBM Compatible, Thompson, Atari, etc).

The third phase is characterized by the local action in all education of levels, short trainee training but also initial and absolutely specialized, logic of the market in the supply of the software and utilisation of a personal computer (PC).

Information and Communication Technologies in Education

The term educational technology is used in order to characterize the rational use of one or more technologies aiming at the acquisition of an educational result. It also characterizes

the results that correspond to those practices.

The Information and Communication Technologies – a term that has been established in a wide scale in the past few years - characterize all those means that are vehicles of immaterial messages (pictures, sounds, a range of characters). Their uses in the educational process have allowed important educational applications both in the instructive and the training process, as well as in the management of the school environment.

We can summarise in the seven proposed arguments of all those elements which promote the introduction of information technology in the school. Some of these reasons refer to the relationship of school with its environment, while others are directly related with the pedagogic questioning. The first argument refers to the private sector rivalry, to the requirements of adaptation of school to the new data of technological development. The information of society imposes new economic commands, which the school should definitely take into consideration. Some people argue that the introduction of new technologies to education will allow the equality of opportunities and the democratisation of study. The computer allows a better training of spirit and, because his rational aspect, a discipline of thought. The new teaching means have important instructive advantages that exceed by far the so far used to school supervisory means. The arguments that focus on a pedagogic beginning of learning have by far contribute to the advancement of the pedagogic research, while, due to their innovative and "revolutionary" aspect, they have legalised the introduction of technologies in the education. The latter argument, even though it is not very often used, is implied in the obvious questions, mainly, in the primary education, and is supported in the aspect - game, that is to say in the attractive way of approach of new technological tools which play an essential role of positive motivation for the students.

In conclusion, all the proposed theories of the last years that are related with the new methods of learning and teaching as well as all the proposals that have been made for the introduction of new educational technologies invoke part or even the total of the previous argumentation, extending it obviously quite often and giving in certain cases important experimental results (Komis 2000).

Approaches of Information and Communication Technologies Integration in Education

We can distinguish at least three different approaches:

Information and Communication Technologies as an autonomous cognitive object that can be included in the program of study and be taught in various stages of education.

Information and Communication Technologies as a means of knowledge, research, teaching and learning that penetrates across all the cognitive objects.

Information and Communication Technologies as an element of general culture and a social phenomenon

The approaches that were discussed in the previous unit do not clash with each other. On the contrary, they complement each other and are interdependent. Thus, in the daily educational practice, it seems that three tendencies of the use of new information and communication technologies in the educational process prevail:

1. as an autonomous cognitive objective (techno central approach)

2. in all the lessons as an expression of an holistic, diathematic approach of learning (completed approach)

3. as a combination of the previous two ways (pragmatic approach) [Markakis, Kontogiannopoulou -Polidoridi, 1995].

The Information and Communication Technologies in Compulsory Education

The compulsory education that is characterized by the dominant role of the teacher (even if this fact has changed in the past few years with the use of specialised teachers), is the school stage, in which the new educational technologies have still the possibility of facing all the children with equal terms. In these frames, the introduction of information technology does not aim to add new difficulties, but on the contrary to offer new, contemporary ways and methods, a supplement of the typical ones, to the achievement of the educational work.

We will now mention an indicative argumentation that, at a bigger or smaller degree, has shaped and supported the decision of the competent ones in the various countries for the introduction and the use of computers in schools.

In particular, the existence and the instructively beneficial use of computers in schools will contribute:

1. To the in the school briefing and familiarization of the children with a multi purpose tool of contemporary technology, that the out of school presence and effect on our life (both adults and children) is important. It is worth mentioning that, mainly the teachers should be informed, be educated and convinced for the use of new technology in school and not so much the students, that are also called and "the generation of keyboard". They were given birth and growing up the season of PC and Information technology, this is their world.

Many of the games of the children of today are electronic, thus the existence and utilisation of PC in school constitutes a positive encouragement for comfortable learning. The microcomputer in the classroom environment functions as a pleasant "continuer" of games that they play in their house.

The first school, if not the preschool education are better for any radical change of the way that the teaching is made. On the one hand this happens because the systematic education of each child begins this period, and on the other hand because any change in the educational process, such as the one that can involve the use of PC in the teaching process, will have ahead all the time, at least of the obligatory education, for application, reinforcement and possible improvement.

The introduction of PC, at the extent that it has taken place in the various countries, first occurred in the secondary schools and afterwards in primary education. This extension, in mass scale, has not taken place in all the countries yet. The introduction and the suitable use of PC in the primary schools would prepare the students to profit more completely from them (that is to say the PC) in the secondary education, instead of meeting them there for the first time in the place of school.

The Communication Environment of the Conventional Classroom

The communication environment of the conventional classroom is *comprised* of the ratio of the professor and student.

The *means* that are used are:
- The voiceless messages – the body language, the rejection or the acceptance.
- The native language.
- The written speech on the static means.
- The book.

The *frequency of communication* among students and teacher is differentiated in favor of the student in the cooperative learning.

The communication is realised via *interaction*:

- mainly of network services
- on the telephone, FAX and
- with natural communication.
- mainly with the form of written speech.
- synchronous and asynchronous.
- with and without natural presence of the participants
- The time of communication is theoretically unlimited.
- The frequency of communication is theoretically unlimited.
- Each student has the possibility of expressing his knowledge.
- The communication with experts is possible.
- The communication with rich sources of information is possible.
- The communication with voiceless messages is annihilated.
- The sentimental communication via oral speech is minimized.

The teacher role in the network communicational mediated learning through a computer is summarized in objects such as:

- The planning of communication
- The observation of communication
- The learning evaluation through a mediated network communication

The teacher should:

- Not make lectures.
- Be explicit in his expectations from the participants
- Be flexible and patient.
- Be responsible.
- Not over-press the students.
- Observe and prompt his students for participation.
- Create small groups and assign training activities to them.
- Facilitate the processes.
- Write comments on the teaching each week.
- Organize the interaction.
- Place rules and models.
- Verify the functionality of the participation rules and observe enforce them.
- Propose explicit processes for the evaluation and the marking.
- Assign groups to play a teacher role.
- Make early diagnosis of dysfunctions in the communication and react immediately for eg. Close conferences that are not productive or have taken the wrong way.
- Be flexible in the materialization of the initial analytic program and make direct decisions of modification where it is required.

Methodology of Teaching

The methodology that should be followed should be based on the use of methods that they would promote, strengthen and encourage:

The activation of student and his entanglement in processes through which he will conquer himself:

- Knowledge,
- The creative action and experimentation,
- The cooperative and the discovering learning,

- The development of abilities and dexterities of methodological type,
- Discussion, the reflection and the improvement of critical thought,
- The development of free thought and expression,
- The learning on how we learn

Besides, because of the nature of the course it can very easily find an application in all almost the cognitive objects. Consequently, it is offered for the eminently application diathematic and interdisciplinary activities through which is achieved the total approach of knowledge and the school time is developed with the best possible way. At the same time, with the activities it supposed to be facilitated and shown:

- The development of the student ability to create.
- The participative-cooperative type of learning
- The possibility of analytic and synthetic thought.
- The exploitation of the calculating and the network technologies as a tool of learning and thought.
- The development of dexterities of modelling and techniques of solving problems.
- The ability to use symbolic means of expression and investigation.
- The improvement of diachronic dexterities and dexterities of methodological type.
- The creation of a climate of mutual respect.

Conditions of E-Learning Materialisation

In order to materialize e-learning there is a necessity of:
- Technology which will allow the development and the materialisation of seminars with success.
- Human workforce that will develop the seminar.
- Trainers who will teach.
- Teaching Material.
- Trainees.

Nowadays the technology is by no means demanding e.g. a server and the corresponding operation system. It also needs a network of computers. It can be the internet of the sector or the internet. Finally there is a need of software for the development and the materialisation of seminars e.g. the LearningSpace® of Lotus.

Specific personnel are needed to:
- Draw and develop the issues or the seminars of the education.
- Play a role of helper/ instructor of the seminar.
- Manage the seminars and the students.
- Manage the server and the network.

The educational material (content) as well as the necessary educational planning are the most important components in order to achieve e-learning and requires the greatest part of time and cost.

The Educational Material (Content)

The forms of the educational material are various. Since the trainees depend greatly on the educational material and they should learn themselves, this material should satisfy particular requirements. Therefore it should:
- Guide the trainee
- Promote his interaction with it
- Place objectives and expected results
- Explain the difficult points and significances

- Have simple and explicit formulation
- Include a lot of exercises, activities and examples, etc
- Allow self-assessment
- Encourage the trainee

The Models

The need of the existence of open models for the description of *learning material* appeared very quite early. The basic reasons that led to the development of models of description of learning objects are:

The need to re-use the training material. It is very important after the creation of a course of asynchronous tele-education for this material to be possible to be re-used the next time when the course will be taught and only briefings and improvements essential. The developments in the sector of tele-education are rapid and the needs which a platform of Asynchronous tele-education is called to cover are continuously increasing so that continuously new versions and new platforms are developed. Furthermore, an upgrading of the platform or a transition from a platform to another one is essential that it not involve a re-creation of training material.

Finally, the following reasons led to the creation of models for the description of training objects and the metadata of training data.

1. The need for collaboration among the Systems of Training Material Management. The instructors often want to collaborate and exchange training material. Therefore, it is essential that a united way of description of training material exist and different platforms be able to collaborate for the exchange of training material.
2. The need for the access and easy search availability. It is important the users be able to search easily in the training material and find what they are interested in.

The Software

The software of education includes a variety of applications, technologies, information and content with final aim the education. A few years ago, we would identify the term **Educational Software** with the educational applications of multimedia for the three levels of education, while today its application to a great extent has been extended to the professional training, life long education and the inter-enterprise training.

Thus, with the term Educational Software we refer to:

A. *Technological Tools - Applications* which serve all the aspects of education, from their management up to the support of the instructive action itself in its traditional form (in the classroom, in seminars) or with the contemporary means (eg. via the internet).
B. *Digital Educational Content* (multimedia applications, on-line lessons and projects, simulations, etc).
C. *Special applications* (such as databases for educational objects).
D. *Supporting Material* (such as special coursebooks for instructors and trainees, educational activities for software access in the classroom or their implementation at their leisure).

More analytically:

Technological Tools – Applications "Management of the Education"

The network in the service of education supports all the involved groups by incorporating a lot of tools of communication, electronic mailing and conferences (more generally e-collaboration). The examples of educational portals in the internet are increasing. In combination

with the increasing rhythm of information production and the increasing needs of education the model *of electronic education (e-learning)* was developed, and a lot of applications of concretisation, distribution and observation of courses and processes were created in order to serve it.

We refer to "*Integrated Distributed Learning Environments*", that is to say internet tools that constitute complete solutions for the service of electronic education (*e-learning*). In such environments, the instructive material is framed by modern and asynchronously cooperative tools, while all the training process is based on the interaction with the instructive material and on the communication with the co-trainees and instructors - advisors.

Digital Educational Content

The educational applications (multimedia) are distinguished as products inside or outside network (on/off line applications). The products outside network circulate widely in CD-ROMs or DVD-ROMs and they bring multifunctional applications of the educational multimedia that they provide
- information (eg. encyclopedias),
- further education (e.g. museum display guide),
- education (e.g. applications which refer to a particular part of material and are included in a broader educational program (e.g. Student education of the 2ⁿᵈ class of junior high school in history),
- training (e.g. exam simulators which pose questions at random and evaluates them,
- process simulators or technical phenomena, etc)

A different category of educational applications constitute the *educational games* that achieve high level of interest of the students providing a high level of interaction of users - children in the case in question - with the software. Also they offer the possibility of exploratory learning.

Basic criteria that differentiate the educational content from the electronic book of apposition of information are inter alias the friendliness of pilotage, the pedagogic validity and the degree of interaction. The levels of interaction are escalated by the simple pilotage, in the multi-leveled pilotage (with use of in favour-connections), in the pilotage with conditions of multiple criteria (as in mechanisms of given databases), in the applications that contain the unanticipated factor (such as simulation experiments with a lot of parameters), in the applications of virtual reality and finally in the synergistic interaction.

In this maximum step of interaction network environments are exploited. In this way the force of the educational community is exploited, that is to say a group of individuals with common interests and objectives that communicate and interact, exchanging opinions or information factor aiming at the creation of communities of educational knowledge (e.g. all users of a software package that produce educational material constitute an educational community).

Special Applications

Special applications for the service of education can be for eg applications databases on the training objects or applications that support the planning of traditional education (eg planning of the hours of professors or classrooms, applications of databases on the elements the trainees or instructors, etc).

Supportive Material

The supporting material such as the special course books for both teachers and students, the educational activities for the integration of software in the classroom or for their imple-

mentation in the spare time of students, plays a vital role in the educational process, particularly in the secondary education. The educational software is necessary to be framed by such a suitable additional material.

Tools of Creating Educational Material

These include:
- Course authoring tools.
- Web site authoring tools.
- Assessment tools.
- Multimedia Processing Tools.

Advantages and Disadvantages of E-Learning

Tele-education brought revolution to the field of education. Until now, the traditional form of education was "teacher-centred", that is to say it was focused on the needs of the teacher and students were compelled to adapt to them. However, if we regard the students as customers we will see that the relationship should be vice versa, the education should be "student-centred". Namely, tele-education brings the student to the centre.

Via the internet the student can have access to rich informative material (international universities, libraries etc). The student can adapt his lessons and create a program that will cover his needs. Thus, lifelong education is feasible since the lesson can be shaped according to the preferences and the time of the student.

Thanks to tele-education the student is given the possibility to attend the lesson wherever and whenever he wants. The educational material is always accessible from everywhere.

The positive points which arise from the application of *e–Learning* are the following:
- ✓ flexibility of time,
- ✓ flexibility of place,
- ✓ flexibility of content,
- ✓ low cost,
- ✓ automation of learning,
- ✓ individual learning,
- ✓ evaluation of effectiveness,
- ✓ support to persons with special needs (disabled),
- ✓ learning through the communication with the knowledge of the others,
- ✓ negotiation of opinions,
- ✓ participation in the learning with wider possibilities of communication, from many to many with the students being active and not passive receptors,
- ✓ variety of ideas and information,
- ✓ more motives and better quality of interaction,
- ✓ promotion of collaboration, reinforcement of communication,
- ✓ active and equal attendance of students, bigger flexibility and more time for data proccessing and communication,
- ✓ emphasis on the student,
- ✓ active participation,
- ✓ intellectual work of students for the imprinting of their ideas in written speech,
- ✓ continuous support among the students and lack of competition,
- ✓ establishment of democratic attitude,
- ✓ it is more economical than the classic education,
- ✓ it allows the student to proceed at his own pace,

- ✓ students from various levels can cover the gaps in their knowledge less stressfully,
- ✓ students get used to technology which they will need no matter what field they will follow,
- ✓ the environment can be adapted to the available resources, needs and level of the students,
- ✓ the material can be presented in a more attractive and interesting way.
- ✓ the teaching material can be renewed and revised according to the last developments,
- ✓ it allows the multifaceted briefing of the student through the addition of various contacts (links).

Except the positive points that arise we should also point out some negative aspects that appear from the application of the method which we are studying. The negative points are concisely the following:

- ✓ The cost,
- ✓ The content,
- ✓ Standardization of knowledge,
- ✓ Impersonal Communication,
- ✓ Lack of interest,
- ✓ Difficulty in use,
- ✓ The resistance of students,
- ✓ Technological obstacles,
- ✓ Lack of planning,
- ✓ Specialized Personnel,
- ✓ Obligation of the teacher,
- ✓ Legal Matters,

Particularly as far as the teacher is concerned, we can notice the following:
- ✓ Restriction of Personal Communication between the teacher and the student,
- ✓ Increase of the obligations of the teacher,
- ✓ Essential Familiarization with the new technologies,
- ✓ High equipment cost – Acquisition and Maintenance.

The Existing Situation in Greece

The most important points worth mentioning are the following:

- ✓ In the frame of the Operational Program of the Ministry of Education, the "ODYS-SEY" action was developed.

- ✓ Also, individual efforts of companies of the private sector have been made for the production of educational CD-ROMs.

- ✓ There are more than 1500 schools (mainly secondary ones) connected with the Internet. By the end of 2001 the Ministry of Education estimates that all schools will have been connected.

- ✓ There are more than 500 schools with modern computer classrooms available for e-learning activities in schools. There is (enough but not negligible) educational software material for Greek schools.

- ✓ The instructive potential is not satisfactorily educated in the use of new technologies.

The Information and Communication Technologies in the EU Countries Educational Systems

The ministers of Education of the EU countries in their effort to give a Community dimension to the new technologies of information and communication in the education process have decided with regard to the metres that concern the introduction of information technology in the European schools. More specifically certain aspects of this decision are the following:

i. Determination of aims and choice of methods in order to introduce the Information technology to young people,

ii. Examination of possibilities of application and use of microcomputers in the various lessons of the school curriculum,

iii. Contribution of new technology to the education of children with special needs,

iv. Participation and training of girls in educational activities, in which the use of computers plays an essential role.

v. Connection of school with the programs of professional training.

The EU has also begun to collaborate with international organisations (OECD, UNESCO, Council of Europe and the International Computer science Office) for Information technology subjects in education. Representatives from these organisations are participating in the various European seminars while they are observing the conferences of experts on the Information of the Community on technology in the Education.

After 1980 the subject of advanced technologies has gradually been turned into a fundamental problem of the European Community. We can indeed say that the during the last 5-6 years all the activity of Community concerns the reduction of the gap that separates it from the other technological superpowers of the world, that is to say the United States and Japan.

Today the pedagogic use of computer occupies the experts in both European and International level. The International Federation for Information processing (IFIP) and the technical committee for education [Technical Committee No3 (TC3)] organises lectures all over the world every five years: World Conference on Computers in Education (WCCE).

In collaboration with same contacts IFIP and TC3, the UNESCO organised a meeting of the ministers of education of countries of the European Community, with a view to examining the results of the introduction of new technologies to the educational systems. From these meetings and the congress of UNESCO with regard to the use of new technologies the necessity for the lifting of inequalities between the industrial and not industrial countries resulted.

France

In France since 1950 the computer has been incorporated into the programs of technical education that led to "Bac de technician en informatique". Since then the pedagogic applications of the computer use have undergone various stages. Since 1971 the study and the use of PC as well as their use in the secondary education have been imported, initially on experimental basis. The plan of 1983 provided the disposal and the use of 100.000 computers in the schools, while in 1985 the project "Informatique pour tous" (the Information technology for all) was introduced, so that every student becomes familiar with the computers and their use. With this spirit the French began a plan that aims to pass the information technology not only in school, but in all sectors of life.

The computer as a pedagogic auxiliary means in France covers all the spectrum of the analytic programs, from the kindergarten to the Higher Education, with particular emphasis on the children with special needs.

The acquaintance with information technology was not limited only to the students, but also to the professors, who were educated in the information technology. The schools were

turned into open centres for the briefing and even the parents of students or any other people who wanted to learn the possibilities that this technology offers.

Today, in the French schools, one can see coexisting, (certainly not during the lesson), students, parents, even farmers, who show intense interest.

A. Main objective

- The familiarization particularly of young students with the new technology, when their brain is open to learning, the knowledge of the same information technology and its limits, as well as the economic and cultural aspects, with which it is connected.
- Autonomy and organisation of work.
- Elimination of training complications.
- Use of a range of programs of the same type (processing, exercises, attraction to various subjects)
- Reconsidering pedagogic practices
- Interdisciplinary work (in a lot of lessons)
- Education of all students in the use of PC, so that they can practise the critical thought and become completely active citizens, who know the social and cultural repercussions of new technologies.
- Ensuring the growth of ICT in education, so that it contributes to the modernisation of the latter.

B. Organizational issues

Three levels of decision-making can be distinguished:

National level: the technological direction of the Research Ministry plans the policy for the technological growth and the innovation and supervises their application. The educational technology, briefing and communication of the Ministry of Education constitutes the point of focus for the co-ordination of the plans and the growth of educational technology. The level of the academy is the region which is interested for the provision, the boosting and the co-ordination of ICT in education. (Academy is an administrative electoral region of the Ministry of Education. France is divided in 28 academies, which correspond with its regional subdivisions). This means co-ordination among various levels of education and collaboration with the local and regional authorities.

The local authorities: the collaboration with the local authorities is not only a subject of financing essential facilities. The local authorities encompass the school activities via their representation in school and governmental organisations. The national planning includes regulations that facilitate the financing (from the local authority) and the school provision of suitable equipment and essential facilities. Moreover, a lot of invitations of proposal submission for the growth have existed eg the ICT in the schools of primary education. In this case there was a financing of multimedia in educational programs almost in 5.000 schools.

The instructive software material escalates in the schools during the teaching of linguistic courses, social courses, even at the postgraduate specialisation. Naturally, the computer is used at a higher rate during the teaching of positive studies (mathematic, physics, chemistry etc.). Even though the French began with the information technology from the educational games, they have passed at a second phase, to the process of "simulation" with the instructive tool that has in its data of knowledge and experiences that the teacher himself has.

The teachers created two thousands (2.000) educational programs that cover the French language and the sector of mathematics, with a view to extending them to all courses. At this

moment, in France nine teams work on relevant subjects with the financing and the support of the Ministry of Education.

C. Teacher's skills

The French selected one thousand twenty four (1024) volunteer teachers of all expertise. From these teachers who were offered have been selected eighty for further training in the information technology, not in schools, but in the higher French industries, that deal with the information technology. Those people worked there as trainees for two years. The aim of this form of education was to learn well that this tool is able to do something for everyone.

In those years they achieved to educate three thousand teachers of all expertise, not technocrats, technicians or scientists of information technology, but three thousands teachers, with complete awareness of the needs of education and knowledge of the educational process.

The teacher should have a tool, but is also essential to think, create the tools through which he will pass his message in the children. In order to achieve this he should be efficient to use a new educational technology. Therefore, the teacher should be familiar with the information technology and the computer. The teacher should be both the producer and the creator of the software.

Italy

The new technology has influenced the school system of the country in two ways: 1) it created a demand for information on this subject and 2) it caused the need to reform the school education, in order to incorporate init the computer and its uses. The national planning for the information technology in the education gave priority to the senior high school, however, mainly in the technical direction, even though the process of the introduction influenced both the High school and the Primary to a smaller extent, though.

The plan of information technology followed the following route: the information technology was widespread enough only to a few types of schools of secondary higher education, and the technical institutes. The national planning for the information technology aims at the introduction of the systematic knowledge of computers in all schools. The planning includes the introduction of computers in the teaching of all courses, beginning from those of mathematics and physics. For this aim: a) the programs of teaching of Mathematics and Physics are re-examined, b) a progressive briefing of teachers, g) takes place specifications for the material (HARDWARE) with which the schools should be equipped are made.

With regard to the primary school education there is no systematic experience from the use of computers. The attention with regard to the use of computers in education in Italy is completely geared turned towards the secondary higher education.

A. Main objectives

- The cover of schools with the essential infrastructure (Objectives: one computer for every 10 students - increase of distribution by the regional units for the audiovisual technology, maintenance and annual renewal of the 25% of equipment, provision of the essential technical support by specialised foreign teachers or experts).
- Connection of all the schools with the Internet (objective: daily access of at least six hours for 250 days annually)
- Establishment of networks and impulse of services (objectives: regulations in every individual school, so that they can have access to the exterior network via a central computer or a router. Creation of material for the courses and equipment for the train-

ing of the teachers. Intensifying of work via the concentration of the already existing experience, as well as development of educational material/equipment. Finding financial resources and establishing collaboration among schools.)

- Encouragement for the development and the use of educational multimedia (objective: the establishment of multimedia in school and the use of local software in the libraries for group or even individual users).
- Incorporation of the ICT study in the study programs (inclusion with the other thematic areas and in all the levels of education· introduction of the computer science as special obligatory lesson during the first two years in the secondary education so that the ICT can effectively be incorporated in this.
- Teacher training and education (objective: the training and the provision of advice so that teachers can be helped in the use of ICT in education). (Sources: programs for the development of the Technology teaching and Italian action plan for the Society information)

B. Organizational issues

The Ministry of Education finances the use of ICT and the supply of schools with electronic equipment (computers). While some of the financing resources go to the regional and provincial authorities for the foundation of official centres, another share from these resources directly goes to the schools or to researches of certain organisations, which participate in the implementation of pilot programs. Since 2000/2001 schools have ensured educational and administrative autonomy and are able to collect the capital for the improvement of the provision of their services.

The supply of schools with the computers and the ICT serve the connection of schools with the Internet and the growth of network services, which have produced collaborations with the private sector: for example an agreement with Radiotelevisione Italiana (RAI) has led to the installation of 5.000 digital satellite dishes, while the suppliers of the Internet offer free subscriptions in the schools. A lot of private exterior organisations undertake a part of the teachers' training.

The revision of teaching programs of Mathematics and Physics in a view of the introduction of information technology was very useful and helped in the modernisation of the study content of these two lessons and the pedagogic methodology.

Among the subjects that are included in the Mathematics and Physics programs there are elements of logic and elements of information technology. Moreover, it is scheduled that, through the teaching of mathematics, the students will always have access to the laboratory of information technology on average one hour a week.

In this laboratorial hour the computer will be used either for the lesson of computer studies itself or for subjects that concern Mathematics, for which the computer is a useful tool.

The program of physics makes provision for the use of a computer for the data processing, for the study of phenomena with the simulation method and the application of suitable applicable software.

Even though the programs of teaching of Mathematics and Physics do not aim at the training of students in the programming, it is certain that the students will learn making small programs with a few commands.

It should be outlined that during the training of the programs it was not sought to indicate to the teachers the programming language that will be used - on the contrary the teacher is free to select the language he himself wishes to. It is believed that the opportunity for presentation more than one programming languages is given in order to make the comparison among various languages possible.

C. Teacher's skills

A plan for teachers' briefing was made for their preparation for the introduction of information technology and the systematic use of computer.

In 4 centres of Academic level (CILIA in Milan, NECK in Bolonia, SOGESTA in Urbino, CSATA in Bari) 4 week seminars were organised, 180 teachers - instructors. Then, the schools of the base were equipped with the suitable equipment.

The ministry of Education gave explicit directives with regard to the type of equipment of information technology that should be used by schools.

- Every computer classroom should be equipped with 8-10 personal computers and with 4-5 printers.
- The personal computers should have at least 256 Kb memory.
- Handling System
- The software (programs) that would be used should be selected by the teachers of the school.

Germany

Even though Germany is ahead in the industrial production in comparison with the other industrial countries, the technologies partly cover the pedagogic needs of the primary education. All he small states of Federal Germany, including western Berlin, recognized that among the duties of school the system is to familiarize the students with the new technology of computer studies and its multiple applications. A common agreement, taking into account the above recognition, led to the decision to include courses of information technology in all the schools of compulsory education for all the students.

Until now the situation in the schools of Germany was the following: the students knew more about the computers than their teachers, who remained attached to the old methods, a lot behind the students.

Besides, in there were neither admissible principles of pedagogic at schools for example how someone can apply these systems, nor pedagogic - instructive principles according to which the teaching should be carried out. The time which is dedicated annually in the introductive courses varies between 30 and 80 teaching hours. The relative analytic curriculums vary from state to state.

A. Main objectives

- The ICT use for the training of the teachers.
- Collaborations and training of educational institutions in the federal states.
- Measures with regard to the installations of ICT. The content of teacher training has also been introduced in federal level.
- New theories and methods of teaching in certain training programs and educational directives.
- Improvement with regard to the organisation and the content of interdisciplinary work for both the teacher and the teaching, with regard to the aspects of new means.
- Personal vigilance of teachers for the improvement of their training with regard to the new technologies.

B. Organizational issues

The responsibilities of the state: the Ministry of Education and the federal states are responsible for the continuous training of the teachers (who are civil servants). The federal government has also the responsibility for the rights of the Internet use, as well as the guarantee for the quality of services and the suitable educational software.

Municipal responsibilities: in general the municipalities are responsible for the installations of multimedia in the public schools and the supply of ICT.

One of the most essential collaborations is the collaboration with the Deutsche Telekom which has provided free access to the Internet in all schools it has also provided 20.000 computers for the programs of teacher training.

In Germany the teaching of computers takes place as a special a lesson. Basic education in the information technology is also provided to all the students. At the same time every school of each stage uses computers for all the students in several lessons.

In these cases, these computers do not constitute themselves the theme of teaching and learning, but they are used as an auxiliary means of teaching.

No particular emphasis is given particular to mathematics, as it is believed that "clear" mathematics is as serious and important, as the "clear" information technology. They also have value as a mind education.

C. Teacher's skills

The professor who teaches information technology should have the basic education in the sector of information technology as well as the faculty of its application in other courses. In order to prepare suitable instructive personnel for the teaching of information technology, there are special courses (seminars), which all the professors who will teach information technology should attend, before they apply it to the lessons of their speciality/expertise.

The education of the instructive personnel, who will teach information technology, begins from the basic education and then it passes to a three-year special education, which takes place in the Universities, but also in combination with the governmental measures of each federal state. After the completion of this study a title is provided to these teachers that give them the right to teach information technology in their schools or elsewhere. These teachers also undertake the obligation to continue their further education in the sector of information technology, with the final objective to being able to help in the training of the school personnel or in the object of information technology itself. Because of this he should have acquired the necessary knowledge and practical faculties.

Great Britain

Great Britain has given priority to the introduction of information technology in education. The teaching with the aid of a computer has begun from the university of Leeds in the frames of Computer Based Learning Project and with object the inquiring work in the Statistics, Chemistry and Medicine. In the progress of time it was extended in the lessons of secondary education, in the Mathematics and the teaching of language.

During the period 1970-1975 the British government inaugurated a national developmental program for the introduction and the growth of CAL (learning via the computer) in the educational organisations of the country. Inquiring programs began to be worked out and be applied in 78 institutes in 33 different cities, in which more than 10.000 students participated and 200 educational packages were made.

In the frames of applications of the educational programs for the introduction of com-

puter in the schools of England, Scotland and Wales (1980-1981), new analytical programs were configured with the incorporation of computer as a pedagogic tool. The English drew their attention into the field of statistics and graphic representations, such as cours, the Socratic dialogue or simple exercises. By supplementing our report, of the period until 1980 we should also record the "National Plan for the Education and use of PC in the schools" that in 1978 the British Prime Minister of that announced. The financing approval of the "program for the growth of Information technology in the Education" for England, Wales, and N. Ireland was announced by the Prime Minister in March 1980. The objective of the program was: "to help schools to prepare the children for life".

65% of the schools had assigned the responsibility for the use of PC in various lessons of the school curriculum in a member of their instructive personnel. The mathematicians were the bigger group of teachers who had attended introductive courses for the use of PC in the education and afterwards followed the teachers of: a) Physics - Chemistry, b) Information technology, as an integral lesson and c) Geography.

A. Teacher's skills

As it was mentioned above, the internal training for the teachers in schools and almost the 1/3 of the budget of this program cover the expenses for further education - training of the teachers. The higher percentage of special education - training that was offered had to offer the teachers, who had already a certain experience on issues of information technology, more and systematic knowledge, so that they could undertake the responsibility for further development (of the system) in their schools, but also organise small duration informative sessions for the other teachers of their school.

Education packages

A) The first category includes those programs which support certain instructive subjects. Such programs are those which offer the students "drill and practice" such as the TRAINS. In this one, children are given a series of sums and if they work them out of correctly they are rewarded with the chart of a train that crosses the screen. There are also the strategy games such as the TOYSHOP which helps the children to distinguish the various currencies, but also to determine the movements of their opponent. Also, programs such as the CRASH, require from the child the invention of a series of directives, in order to lead them to an arrow among a series of obstacles and finally achieve the objective in this way.

B) This category includes programs that activate learning activities for a period of time. An example constitutes the program of MARY ROSE. The first part of this program simulates the research for the point of sinking of the MARY ROSE, a warship. The discovery of the place where the ship lies and the calculation of precise geographic width and length of the shipwreck constitute the secret key, that is essential for the children, to continue with the second part of the program. This includes the careful preparation of diving, a detailed and three-dimensional exploration of the shipwreck and the assembly of pieces that were pulled out of the bottom. A teacher with imagination with a classroom of older children can use the program, in order to prompt them in researches in history and a pile of other activities.

C) The third category includes programs without certain content that provide an easy to use implement for teaching and learning. An example of this is the turtle. After the corresponding command to advance or behind a certain number of units or turn either left or right a certain number of fates. While it is moved, various of linear

drawings are related. Using the land turtle of or that of the screen that it draws only on the screen of computer children aged from 6-11 or even older, can give themselves choices that extend their forces of reasonable thought and the comprehension of mathematic significances, which is difficult to be different at this age. The graphics of the turtle are a part of the programming language LOGO and they lead the children to the first steps of programming in this language.

Spread of New Methods and Society Participation

According to the review of the European (but also the international) experience, we come to the conclusion that the use of Educational Technology in the school practice presupposes long-lasting activities of networking of organisations and people with certain objectives. In order to develop in the particular field of better exploitation of Information Technology, schools cannot remain isolated, but they should collaborate with other institutions that daily confront the same problems and the same challenges. It has become common conscience that the promotion and the distribution of innovation in schools, which should be directly related to the use of new Information Technology, it should be mainly based on the continuous exchange of experiences in the frame of networks which are constituted of schools, teachers, researchers, educational authorities, structures of production of educational material etc.

In most countries (and progressively in Greece), certain actions have been undertaken, in the frame of complete strategy for the information of teachers, parents, structures of software production. Sometimes the information is transmitted with electronic means (CD-ROM, Internet), while frequently the Ministries of Education create special services of information for schools and teachers that wish to make use of Information Technology. Certain initiatives have been undertaken in local, national and European level for the process of competitions and the prize award of educational software, as well as for the prominence, the award and the distribution of the most appreciable practices and actions which concern the utilization of computers and networks and they are materialised by schools, teachers and students. Finally, initiatives have begun to develop for the distribution of information for products and services in the field of industry.

Indicatively certain rewards are mentioned, competitions and networks that have made their appearance in the past few years:

Rewards MENON, Orfeus and NeMA

Networks Netd@ys, MENON, ENIS (European Network of Innovative Schools), TEEM (Teacher Evaluating Educational Multimedia)

Conclusions: Guidelines for the Future

The introduction and the utilization of educational technology in the schools have begun to constitute a serious priority for a lot of educational systems internationally. It prevails, as it appears, the opinion that the investment in the new digital technologies for the school education has important social and economic benefits, while it is regarded as an essential presupposition for the improvement of the educational process and its results, but also for the best preparation of the new generation in the view of the Information Society.

Many times the introduction and the use of educational technology are connected with the significance of a wider and a more essential change in the content of the school education, which is regarded as necessary in the current and permanently altered social environment. In the same frame, the catalytic effect that the new technologies of information and communication can have on the space-time structure of school are pointed out, the structure and the operation of school knowledge, the role of the teacher and the student, the moral and social dimension of the education.

Generally, it has internationally been ascertained that the national, regional and local initiatives that aim at the promotion of the use of TOP in the school Education were multiplying in the middle of 1990 decade and following. In a lot of countries, the initiatives for the introduction of educational technology begin from the Ministries of Education, while in other ones there are is a bigger decentralisation and regional action.

The application of relevant policies is usually supported in three mechanisms: legislation/enactment, financing and information. The main objectives of international, European, and national initiatives for the promotion of the use of Information Technology in school Education are summarised as: (a) equipment of schools with computers of multimedia, (b) training teachers to use digital technologies, (c) growth of educational services and software, (d) acceleration of networking of schools and teachers.

The introduction of the new Information and Communication Technology in the educational systems of the European countries, however, constitutes a difficult and complicated undertaking. While there are a lot of luminous examples of experimental work and interesting national initiatives, their essential effect on the educational systems is not yet so much effective.

In order to achieve an essential and systematic exploitation of Information Technology in the school, the research, the experience and the progress of educational policy in this sector converge to the following basic conclusions, which could be regarded as guidelines for the future:

Overall and Collective Approach of Information and Communication Technology Introduction in School

It is proved that the promotion of school innovation needs the participation and the support of all institutions of the educational system and society and it is essential that the necessary opportunities should be given in order to come to a convergence of the decisions that are taken centrally with the local initiatives. The schools in order to promote effectively certain strategies of Information Technology exploitation, the educational Authorities should observe the achieved efforts which begin from both school and the local societies - when they develop works of a big scale - and correspond to their needs.

On the other hand, the review of international experience leads to the conclusion that the use of Information Technology in the school practice presupposes long-lasting activities of networking with a certain aim. The schools cannot be developed in this sector and better develop the Information Technology, if they do not contact other schools that daily face the same problems and the same challenges. It is common conscience the fact that the promotion and distribution of innovation with the use of Information Technology in the school should be based more on the continuous exchange of experiences in the frame of networks, which are constituted of schools, teachers, researchers, educational authorities, producers of educational material etc.

Subsidy According to the Real Needs of Schools

The international experience shows that the cost of introduction and use of technology in the schools depends on a lot of factors, such as the quantity and the quality of equipment, the quality, the frequency and the duration of training of the teacher and the other personnel, the duration of the use of technology, the type of software, the speed and the type of connection, the logic with which it is out into practice the improvement of the technical and construction infrastructure of a school, the form and the frequency of continuous technical support and maintenance, the type and the frequency of the upgrading of the equipment and the software, the telecommunications cost and the cost of the access to the Internet.

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Consequently, it is explicit that for the financing of educational technology in schools we should not only calculate the initial investment, but also the continuous needs of the functional expenses cover. The schools and the local educational authorities are supposed to distribute their economic resources in such way that the initial acquisition of equipment is not against the upgrading and maintenance of the existing one, the computational acquisition and other educational material, the training of the personnel and the continuous technical support. The schools are called to develop their autonomy with regard to the cover of expenses of the maintenance and the upgrading of their equipment from the budget for their continuous operation and not to rely on subsidies and programs exclusively. The systems of educational administration, on their part, are called to develop higher flexibility on issues of financing and economic management of schools.

Innovation in the Planning of Curriculums

It is required to do a total review and development of the school curriculum in order to achieve the integration and the systematic exploitation of Information Technology in the school. This involves the determination of new educational objectives, criteria and evaluating systems, the development of new methods of school support and concerns globally the nature and the operation of the educational system of a country. Consequently, the assimilation of Information Technology in the school program requires complicated educational planning, which begins from the definition and the clarification of the most general educational objectives and includes the content, the progress of learning and the systems that will be applied in this progress.

The treatment and the guidance of such an educational planning constitute the most difficult point in the assimilation of Information Technology in the school curriculum and require the redefinition of school role, both of the teacher and the student. The policies and the strategies of the application of this planning must take into consideration the fact that the generalized use of Information Technology will result in the emancipation and the enhancement of the autonomy of the student. The autonomy of the students will require new and more complex skills on the part of the teachers, who could progressively less and less rely and depend on their formal instructive sides of their role.

Nowadays, most European countries regard the Information Technology as tools that can be developed in all the cognitive objects, in the frame of the school curriculum, and this is reflected in their announcements and attitudes. However, a few countries, such as the United Kingdom and Denmark, have developed the institutional frame for the integration of Information Technology in the school curriculum in all the cognitive subjects and in all the educational levels.

No matter what the difficulties that emerge are and require confrontation, at this moment it appears that the Information Technology can be integrated and be used in the school curriculum in two levels: (a) In interdisciplinary/diathematic frame: As a tool of individual creation for the implementation of common activities in most courses, as a tool for the support of collective activities and diathematic projects, for the development of the basic abilities and special education. (b) In the frame of specific cognitive objects: As a useful tool during the development of a circle of courses and as a place of learning of a certain topic in a certain cognitive object.

Development and Enhancement of Human Resources

It is proved that the viability of the models of the introduction and the exploitation of Information Technology in the schools depends mainly on the effective combination of the human and material resources. Very often, important initiatives emerge at school through the organization and activity of the teachers and the members of the school community generally.

However, in order to strengthen these initiatives and further develop them in the daily practice, the human resource must be supported in any possible way.

Most countries have begun to realise that, despite the given emphasis to the equipment and network installation, only through the continuous training of the teachers can all these be utilized to benefit both the students and the learning process. Moreover, it is clear that the nature of school and the profession of the teacher require a different approach of training and dictate different methods from the methods of training that are generally used in the place of enterprises and production.

In this frame, special measures must be taken, in order to ensure that the use of Information Technology will be included in all the programs of the initial education of the teachers and that all the teachers will have access to the suitable internal training, which will meet their particular needs. The teachers should receive continuous support and advisory assistance and at the same time they should have the required frame of time to familiarize themselves with the means available, incorporate the technology into their own lesson plans and exchange opinions and experiences for the use of technology with other colleagues. It has been proved that in an initial stage the teachers need increased support and later on when they acquire more self-confidence, they are capable of exploring the new learning potential that the Information Technology offer.

The most innovative plans are often the result of the initiative which some groups of enthusiastic teachers undertake, who sacrifice a lot of personal time and energy for this project. Most of these projects are mostly based on voluntary work, which is seldom taken into account in the existing educational system. The role of the teacher is neither downgraded nor undermined, but it becomes more complex and more demanding, given the fact that the teacher becomes an instructor, a designer, an advisor, a clear-sighted observer, an assessor and a coordinator and does not only function in the level of information transmission. However, it is conceivable that some of the new abilities that the teachers are called to develop often correspond to different profiles of positions and constitute new professions. In this frame, the meaning of the Distributed and collective faculty is expected to play an important role in the organisation of the projects and the activities of the school.

With regard to the role of the student in the process of introduction and use of Information Technology in school, we could say that the student acquires higher autonomy as well as responsibility. In order to realise activities with the exploitation of Information Technology in school, it is essential the students develop critical ability towards information, so that they can select, interpret, connect, compare and finally use it for training purposes. Generally, the active participation of students and the increased possibilities of communication, collaboration and access to out of school sources of information can have both positive and negative results. On the one hand, the students comprehend that knowledge is a social product as well as the way by which the information is converted into knowledge. On the other hand, certain intellectual and social dangers lurk when the students come alone out in the world of adults, without taking the essential safety measures. The protection of the students from such dangers, when and where access in the world of adults is provided to them, is a responsibility of all.

Generalisation of the Access to the Information and Communication Technologies and the Educational Content

Internationally, we detect great differences with regard to the infrastructure and the access to the technologies that are offered in different schools, mainly in Primary Education. The access constitutes a strategic point for the educational exploitation of technologies in school, however, its generalisation is proved to be a particularly complicated objective for almost all the countries. Concretely, the generalisation of the access of schools to Information Technology

has social, economic and moral dimension.

The social dimension concerns equal opportunities and the democratic distribution of information and its means of creation. The access to communication and knowledge tools based on calculating and network technologies should be feasible for all the students, no matter what their socio-economic level, nationality, race, gender and place of residence is, and particular emphasis should be given to the use of technology by children with special needs. However, since the educational use of computers is also provided at home and the percentages of students with their own computer vary according to their financial potential, the social status, the nationality etc, public measures must be taken that will help the alleviation of inequalities in the access of students to computers and networks out of school.

The economic dimension is connected with the general demand for the increase of the computers, the creation of local networks (LAN) and the continuous access to the Internet. However, the networking of schools is not a simple undertaking, if anyone contemplates that there are different types of networking, which entail different decisions and choices as far as the cost is concerned.

The moral dimension is connected with the autonomy of access to technologies and the moral problems or dilemmas that this involves. In other words, schools are called to place a part of their equipment in a place that would facilitate and serve both the autonomous and group work of the students, as well as their direct access to additional material and sources. However, at the same time they are called to develop or adopt practices for the safe use of the material to which the students have access, specifically in the Internet, which all the members of the school community and society do not always accept morally.

The generalisation of the access to educational material is also closely connected with the matter of lack of educational software of multimedia and network material in the national languages. This in certain cases could require governmental boosting, in order to strengthen the commercial activity in the market and it is advisable commercial producers be encouraged to use teachers and other experts as advisors or assistants in the stage of application testing.

At the same time, since the middle of 1990, worldwide network services of tele-supported learning for schools have been developed. The appearance of national networks and educational providers such as the Nordic Schools Data Network, with its respective applications in various countries and the National Grid for Learning in Great Britain as well as some over-networks, such as the European School-net, helps in the disposal of educational checked content and services for use by teachers and students.

On the other hand, with the continuously increasing distribution of the Internet, the cost of the digital distribution tends to be negligible, so that certain hearths of production of digital material are developed for the school apart from the official market, which will probably play a very important role in the following years. In this frame, the tendency of teachers and students to be designers of educational software is promoted, provided that they are familiarized with the new possibilities of collection and composition of the material.

Progressive Change of the Space-time Organisation of School

The exploitation of new technologies in the school allows us to exceed the limits of space and time, to exceed the isolation of the school and develop the idea of a learning community, in which the school will be a source of knowledge for the society and the society a source of knowledge for the school. However, such innovations require new and different infrastructures of support and forms of organisation in the school, since the space-time structure of the current school does not encourage the introduction of computers and networks for use by students and teachers.

More concretely, it has been proved that the place of computers in school, the organisa-

tion of place during their use and the guarantee of access to them constitute real problems, provided that in the structure and the operation of the current school the exploitation of Information Technology has not been predicted. We should take into consideration that the teachers as well as the students wish the possibility of access to the equipment in the place where the lesson takes place daily, so that they can exploit more systematically the technologies in the teaching and learning process.

Consequently, if there are computers in each classroom, the place of the traditional classroom should be reorganized and enriched with other sources of information transmission and with supervisory material. At the same time, if there is another place with computers or a library and supervisory material room, then we should familiarize with the idea of a freer classroom, since the children must move - in groups and alternately - during the teaching hour, so that the combination of the software use with the rest of the sources, means and activities required for the course is facilitated. Particular attention is needed in the organisation of group and cooperative activities in school, since it is explicit that proportional learning processes require different conditions than the traditional space-time organisation of the lesson: we move from the meaning of classroom to the meaning of learning community.

Emphasis on the Educational Exploitation of Information and Communication Technology

Although the skills in the computer use will be undoubtedly essential in the 21st century, it is important technology be incorporated in the school curriculum and not simply be used for the acquisition of knowledge and skills that concern the technology itself. Great attention should be paid to the use of technology for the service of innovative pedagogic methods, which encourage the growth of high cognitive faculties.

In this sense, it is vital to strengthen the type of training that helps the teachers to comprehend the new possibilities of learning and organisation that the Information Technology offer, combine the use of Information Technology with innovative pedagogic practices, with different cognitive objects but also with the promotion of the interdisciplinary knowledge.

We meet the most advanced uses of Information and Communication Technology for pedagogic aims in the Primary Education. This can be explained because only one teacher has the responsibility of a group of children, the use of multimedia software has a more differentiated, attractive and playful character, and the content of Primary Education is not connected with the examinations, as opposed to the Secondary Education. The use of Information Technology is focused, as it appears, on the student more than in the Secondary Education.

In the past few years, the development of information and communication means has given new possibilities to both students and teachers, to broaden their horizons outside the narrow limits of their classroom and school, developing new methods of schoolwork and learning processes. Thus, more and more activities are always recorded, in which students produce material and tools of learning for other students, participate in local or global discussions on various common subjects and problems that concern all citizens, and collaborate with various organisations that produce knowledge and other goods, acquiring access to multiple sources of information and exploring files, collections, museums, libraries and other sources.

Enhancement and Systematisation of Research and Evaluation

The educational authorities of all countries should take into consideration in all levels the existing educational research, in Europe and elsewhere, when they decide the educational policies and actions. The research in new objects that are related with this sector should also be inaugurated. Also, the research that concerns the innovation and the change in organisational level should be taken into account.

In order to ensure both the effectiveness and the relationship of attribution - cost of the educational technology in schools, an extensive program of systematic scientific research for the educational technology is essential. The ministries in charge and the regional authorities must collaborate in the collection, analysis and distribution of data, which will not only concern the investment in the system, such as the proportion of students-computers, but also the variables in the process, such as the use, the time of access of the students and the teachers as well as the real results.

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