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FINNISH AND ITALIAN TECHNOLOGY IN THE GLOBAL ENVIRONMENT OF EUROPEAN COMMUNITY: A COMPARISON OF ICT STRATEGIES IN EDUCATION

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For my dear
grandmother Giovanna
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INTRODUCTION

The passage from industrial society to a society of information and knowledge is influencing all aspects of life and, in short, could bring about radical changes in lifestyle and the ways in which we relate to others. In the information society, the level of knowledge and competency achieved has become a key factor in determining individual success. Required knowledge is traditional, but is now united with a growing number of new skills, in intercultural, computer, linguistic, and ecological fields. As an integrative part of society, the educational system is now facing new challenges that spring from this transformation and that open up new possibilities. In preparing citizens for the future, the role that schools play is fundamental, and schools must keep up with cognitive, cultural, and technological changes. Scholastic cycles must prepare young people to enter into the work world where flexibility and adaptability are recurring concepts and necessary to get ahead. The idea of one constant job for one's entire life is no longer part of the contemporary world. To survive in this type of society, "*lifelong learning*" and "*learning to learn*" become key concepts. Self-learning takes on great importance, and computers, and the Internet can help since they provide access to any type of information and knowledge that exist. In this context, it's not only important to have access to information, but to know what to do with it.

Governments from around the world, realizing these changes, have prepared strategies and multi-year programs so that each citizen may have the basic abilities necessary in order to use available information instruments, to communicate with neighbors, to learn and to express their individual worth. The problems in information societies and Community programs for education and new technologies are discussed in the first chapter where space has been dedicated to the program eEurope, that is still at work today.

Next, strategies for the technological innovation of the education sector are presented, as well as the implementation of such in two countries, Finland and Italy, two very different countries that are however, connected by the European Union. The choice is not accidental, the Nordic country has an educational system according to the latest European norms (PISA) and is one of the most technologically advanced countries. Italy,

however, has a long theoretical tradition, but today finds itself behind in technological innovation and with an education program that needs to be brought up to speed with the current times.

The Finnish landscape is analyzed in the second chapter, where the Finnish educational system is discussed and its ICT strategy. An in-depth analysis is made on the actualization of the strategy through school visits, a questionnaire that was sent out and the studied results, interviews with teachers, school presidents, students, and administrators. Finally, some case studies are presented: in the area of interactive learning and communications proposals of the Cultural Association Maailma Tutuksi, the development of ECDL in Finland, the nation that started the idea but that only recently adjusted to the license, distance learning in small north-central Finnish schools where technology has helped win over environmental difficulties, the Communications Camp where new technologies, ecology and the importance of self-expression are experienced in an innovative learning atmosphere that could have more diffused applications in the schools of tomorrow.

The third chapter presents the landscape of the Italian educational system and the recent reforms proposed. Since computers are one of the central points of school innovation, a historical discussion on the use of new technologies in Italian schools is brought forth, from the first pilot projects to the most recent strategies like PSTD and the "National Plan for Computer and Technology Education for School Personnel". The following analysis presents the current situation, or rather the current guidelines proposed, school visits, interviews with people who have been in the school system for years, and a study of the completed questionnaires received. Lastly, two case studies are discussed: the first is about the ECDL situation in Italy that is one of the fastest growing programs in Europe, the second is on innovative experiences in Emilia-Romagna, a leading region on the use of new technologies in teaching.

The fourth and last chapter presents conclusions on all of the research conducted, with a comparison between the Finnish and the Italian ICT strategy, with some comments on each educational system. Then, some notable results derived from the comparative

analysis of the questionnaires are discussed, highlighting some of the strengths of each country as well as common obstacles.

Starting from the idea that in order to have equal possibilities in the global job market all European citizens should have the same level of linguistic, technological, and cultural knowledge, a proposal is made to create a European model school, the "Unified European high school" in which governments, teachers and students must all actively and responsibly collaborate at different levels. The imaginary vision of such a school, concludes the entire body of research.

CHAPTER 1

1.1 Introduction to the European Union

The idea of a unified Europe had always been on the minds of many humanists and politicians, but unfortunately it had to come to terms with a reality made up of economic and political interests, one that didn't allow for concrete development until about fifty years ago. In fact, May 9, 1950, in a speech that will forever mark history, Roberts Schuman, foreign minister of France, inspired by Jean Monnet, proposed the union of France and the Federated German Republic, and any other nation that so desired, in an economic community based on coal and steel. He began his announcement with a few introductory phrases: "*It is no longer about vane words, but about an ardent and constructive act. France has acted and the consequences of her actions could be immense. We hope that they are. She has acted essentially for peace. But until peace has truly the possibility of success, there must first be a Europe. Exactly five years after the unconditional surrender of Germany, France made the first decisive action towards European construction, associating itself with Germany, which must completely transform the condition of Europe. Such a transformation will clear the way for other communal actions, until now impossible. From all of this, Europe will be born, a united and solidly planted Europe. A Europe in which living conditions will improve thanks to a regrouping of production and the expansion of markets that will provoke a drop in prices.*"[Fon00]

The Community was born out of the spirit to search for and maintain peace, and to create an effective solidarity between states according to four fundamental principles: superiority of institutions, independence from communitarian organisms; collaboration between institutions; equality between the member states. The first three principles, in particular, seek to make European institutions free from member states, so that no one state is tempted to subjugate another and there are no conflicting interests, nations separate amongst themselves, in a collaborative state and not subordinate. Also, the fourth principle is very important, which guarantees to all states, independent of their quantity of production, equal weight in the decision making process of the community.

By the next year the proposal had become reality. Six European states (Belgium, France, Germany, Italy, Luxembourg, and Holland) gave life to the European Community of Coal and Steel. Beginning that year, the Community continued to strengthen itself, new countries joined and the necessity to converge political ideas on an increasing number of issues grew.

A fundamental development occurred in 1957, with the treaty of Rome, in which the European Economic Community (EEC) was officially instituted, as well as the European Community for Atomic Energy (EURATOM). The treaty was based upon free circulation of workers, services and goods. On July 1,1967, the treaty signed in Brussels on April 8,1965, went into effect, which united the executive aspects of the three communities (CECA, EEC, EURATOM). From that moment forward only one Commission and one Advisory Council exist.

In 1962, the member states decided to realize a common policy also regarding agriculture and in 1968, taxes were abolished on products crossing the borders of community countries. The road taken by the community evoked the interest of many other European countries, which then requested membership. In 1973 Denmark, Ireland and the United Kingdom became members of the European Community. This first enlargement, that raised the total number of member states from six to nine, provoked greater reflection upon a convergence of ideas also on social, regional, and environmental questions. The need for a common economic and monetary policy became more evident when the US broke the convertibility of the dollar. The situation became even more critical with the two oil crisis, first in 1973 and later in 1979, which drove the member states to create a common monetary system within that same year: the SME.

The main goal of the new monetary regime was to create a stable monetary zone in Europe. Other objectives pursued were: the reduction of the risks involved in speculative operations, fairly high in the system of flexible exchanges, introduction of virtuous behavior into the governments of adhering nations, by paying close attention to anti-inflationary policies, creation within Europe of an economic and monetary area able to compete with the United States.

In 1981, Greece also joined the European Union, followed by Spain and Portugal in 1986. These last enlargements earned the 12 member countries greater international

respect, but also made greater efforts to reduce the economic inequality among the member nations necessary.

It was during these years, beginning in 1984, that Europe defined its first research and development program for information technologies: Esprit. The first part of the program progressed between 1984 and 1988. This phase sought to give greater strength to industry using new technologies for the improvement of products and services and to increase operating efficiency in an increasingly global market.

In politics, community countries worked hard to reach a common agreement regarding international affairs and security and defense policies. The fall of the Berlin wall in 1989, the unification of Germany in 1990, and the break up of the Soviet bloc in 1991, transformed the political structure of Europe. In this context, the European Community grew even stronger and instituted a new program, which sought as its highest ambition monetary unity by 1999.

The Maastricht treaty of February 7,1992 was the concrete expression of the desire to grow and progress together. The treaty regarding the European Union signed in the Dutch city did not limit itself only to economic and monetary dimensions, but also installed other objectives, among which the institution of European citizenship, the promotion of an economic growth policy seeking to lower unemployment rates, the development of cooperation in judicial sectors and internal affairs, and the realization of common foreign and security policies. In close relation to the creation of "citizenship of the Union" article 126 of the treaty reads that the Community "contributes to the development of quality instruction" through actions that seek, above all "to favor the mobility of students and teachers, promote the academic recognition of degrees and periods of study". And the EC council declares (in article 57 of the treaty) "directives aimed at reciprocal recognition of degrees, certificates, and other titles", with the goal of facilitating the access to professional activities.

In 1994, Martin Bangemann, member of the European commission for information and technology, during a seminar on the information society, presented the cultural origins and economic impact of new information technologies. In one of the fundamental passages, Bangemann affirmed that "*the information society is possible for every citizen. Europeans will benefit as citizens and consumers and their quality of life*

will increase".[Ban94] The report identified for the first time the huge growth potential of new information and communications technologies. Seen within these fields were growth rates not found in any other field. That meant the possibility of creating new job opportunities, making available a just and adequate structure of regulations, in particular in order to launch new applications.

In 1995, the European Union reached its current form thanks to the entrance of Austria, Sweden, and Finland. In the same year, thanks to the Schengen agreement, the borders between community countries were demolished and, starting from that moment, the goal of a free circulation of persons, goods and services was achieved. [Fon98]

Students also increasingly benefited due to this "opening", as seen through the beginning of various projects aimed at cultural integration, with the goal of creating European awareness. Among these programs, and certainly the most known, is Socrates, which includes exchange programs for all levels of education. These are: Erasmus, plan of mobility for university students within the European Community; Comenius, European program for integration and exchanges between primary and secondary schools within member countries; Lingua, for the diffusion of linguistic competency within the Community area.

The treaty of Amsterdam in 1997 reinforced even more so the role of the European parliament in the area of international politics. The parliament gave itself four main goals: to make employment and rights of citizens one of the priorities of the process of European integration, the elimination of all obstacles to free circulation of persons and to increase security, to create greater cohesion within respective foreign policies of the Union, and to confer greater efficiency within the institutional structure of the union in sight of future growth. On January 1,2002, another huge step forward was accomplished, the Euro, the single monetary unit of the Union, was put in pockets of 375 million European citizens. Another ten countries, belonging mostly to Eastern Europe, have requested admission to the Union, and therefore, within the next decade the Community will expand again, up to a considerable sum of 25 member countries. Other battles await Europe, given that any expansion corresponds to an equal number of difficulties due to the heterogeneous interests of member countries. If the organization remains democratic,

efficient and is able to allow different countries and cultures to coexist while maintaining their national identities, the Union will gain an increasingly important role in the world.

1.2 The Information Society

In the age of Enlightenment, philosophers based their cultural ideologies on the supposition that man is by nature imperfect and can become civilized only through an educational process. This requires the acquisition of knowledge. There was also a need for educators, who could mold human nature according to universal principles recognized by reason. Education has long been reputed as an irreplaceable resource able to give answers to the thousands of questions that come to mind. Now it is assuming startling shapes, because the process presents itself as a more complicated comprehension relative to when it was believed to be an exact representation, objective and true to the object of observation.

In our post-industrial age, new problems emerge, even of a cultural nature, connected to the information society. Today, and around the world, communications and information technologies are indeed bringing humanity into a new era, with an impact comparative to that of the big revolutions of the past, influencing the structure of society and affecting everyone. It is a revolution, the present, based on information, the very expression of human knowledge. Information bombardment, its temporary nature and uncertainty, force the acquisition of a new epistemology and of a broadened critical sense. Even the common man is, or should be, aware that "Modern knowledge is not a static code, it is in a continual state of transformation," which has erased "the legitimization of 'one' proposed source for the transmission of knowledge", that "modern knowledge no longer contemplates 'contents' transmitted, but ability of self-generation, of self-information, of self."[FraSeg94]

Today, technological progress allows us to elaborate, imagine, research and communicate data in any form, oral, written or visual, without limits of time, space or volume. "This revolution adds immense potential to human intelligence and constitutes a resource that will change our way of living and working." [Ban94] Like all big transformations, this not only creates opportunity, but also uncertainty and discontinuity.

The opportunity exists to increase the quality of life of citizens, to improve the efficiency of social and economical organizations, and to reinforce the cohesion of people. The uncertainty, notable, is that which comes from a technology of which one is not yet an expert of, and therefore, it is unclear how to optimize its use. Discontinuity is born of the necessity to reorganize at all levels of society. Some habits and necessities remain the same as before, others will be created or modified to form the new society of knowledge. Remaining attached to the past means being excluded from the present. This, in other words, means that every citizen should possess the basic abilities necessary to use technology, or risk being marginalized in society.

It is the duty of government, through educational systems, to provide this basic education to all its citizens. Failure to do so could bring about a new social division, in which the rich, that have the possibility of choosing schools with more equipment and innovative programs, will have access to job openings, especially managerial positions. It should also be said that technical competency alone is not sufficient, it must be put together with the ability to find the correct answer in the ocean of partial information and scarce significance that is available to everyone.

The reactions of society, in the various phases of life, to these innovations are multiple and some comforting results can be identified and some more worrisome. For example, one study on the information society [Nur01] shows that the overwhelming majority of those interviewed (90%) are not worried about information bombardment, while the high hopes of Europe to create new jobs with the use of informational technologies were not convincing: only 48% of people interviewed are convinced that governmental efforts will produce some results in this area.

This new revolution has a big impact also on pedagogical fields: students are no longer viewed as passive receptors of instruction, and learning is no longer seen as a duplication of the knowledge of the educator within the student. By nature, man is active and desires to produce, work and resolve problems. Education does not have to be static, but should help to find the right answer in every situation. Therefore, new theories have been formulated, based on the concept that the student should learn and understand in an independent and lasting way (“lifelong learning”) and should develop individual strategies for problem resolution (“problem solving”).

1.3 ICT and Education: Problematic and Controversial within Europe

For a long time education has been based upon access to a rather limited amount of information, upon which an individual was created through traditional pedagogical theories. Today circumstances have changed: it is fairly easy for anyone to access a large amount of information regarding any subject. Today, knowing how to find information is not what counts, but rather knowing how to use it.

The job of teachers at all levels of education is to transmit this ability to young people. Since new technologies were the vehicles that brought about this change, we must count upon them to transmit the new abilities and to develop new teaching and learning techniques. Understanding this, governments have developed necessary infrastructures, equipping schools of all levels with an increasing number of computers, connecting them to the Internet and gradually introducing computer courses in some institutions. Notwithstanding these efforts, it should be said that the presence of ICT alone is not a sufficient guarantee that society will improve in quality of life.

Recent studies have in fact demonstrated that current instruction methods using new technologies have not obtained better results than traditional methods and that a certain resistance to their use remains, above all among older generations. Identifying and modifying the role of teachers and students is fundamental to understanding how to apply new technologies with greater success than in past experiences.

At the beginning of the 21st century, particularly after the end of the Second World War, many generations of teachers faced the advent of new media. Adapted first in everyday life and then gradually in teaching, other methods of communication developed along side traditional books. Therefore the use of other technological instruments in this sense is not completely new. In order to understand the value of educational communicative instruments, a brief review of the methods of transmitting knowledge is useful.

Before the discovery of print		
Society dominated by oral culture	Mnemonic culture and conservation	Culture is transmitted from father to son and community facilitated education.
After the discovery of print		
Discovery and diffusion of print	Passage from mnemonic tradition to learning from books, in practice and in training to further learning literacy of young generations necessary	Knowledge is transmitted by institutions, education is founded by authority figures and by privilege, first, of the few, and later for all-at least potentially-for the control of the community (sharing of laws, values, beliefs, and goals)
With the advent of new media		
Advent of electronic media and of self-medias	Polysensory dimension of communications	Crisis of education in the family and at school due to the multiplication of information agents Technological education necessary

Table. 1.1: Historic table of the transmission of knowledge

The introduction of media has constituted a revolution in learning processes, a crisis for whoever is now confronted with as many stories as points of view from which they're told. Often utility and futility direct and accompany his/her life, making him/her a subject conditioned by unknown obscure sources. Facing such a situation, the educator must impart to the student similar instruments in order to understand the surrounding reality, an opportunity to free students from conditioning and to impart critical abilities, but the educator cannot do so by ignoring the new presence of media. At a pedagogical level, this means the transformation of two-way communication into three-way, creating a didactic dimension in which active and interrogative methods are given priority, favoring the problematic and critical interpretation in the context of a transformed and enriched role of the instructor. From giver or almost exclusive source of information, in this contest, he/she assumes a more creative function of mediator respective to the quantity and quality of communicational and educational messages.

Not only is this a different structure of educational intervention, but the previously closed circuit that was limited to two poles, teacher and student, now includes a third pole, the medium, complicating in a positive and constructive sense both the process of interpretation of the didactic interaction and the phase of verifying and controlling the learning process. It's apparent, in fact, that a multiplication of sources and cognitive stimuli must correspond to a parallel reorganization of the modes of emission and reception, of teaching and learning strategies, of informative feed-back and critical insight, of global administration of content and of individual learning times.

The formative value of didactic communication in a tri-lateral model, then, is not only tied to the contents of the message, but to the functional relation tied to the construction of the significance. The sense, anyway, is derived and will be conditioned by the relationship between the three vertices: instructor, medium, and student. New circumstances force teachers to turn over a new leaf: instead of the old professor closed within the rigid rules of his curricular program, there is a new teaching figure updated and open to the flexibility and multidisciplinary nature of knowledge, demonstrating abilities to use new technology to capture the interest and curiosity of students, but above all capable of empowering learning, competency, and ability, transforming new methods into cultural amplifiers, sources of new ways of learning, which include understanding and creativity. [AAVV97]

A study performed in the United States, where the inclusion of ICT in teaching is at a higher level than in Europe, showed that the workload and responsibility of teachers has grown significantly with technological innovation. Apart from studies and recommendations, it's possible to come across two different attitudes of teachers regarding new teaching methods: the first, a more restrictive point of view that tends to select before hand the contents to show to students, protecting them from undesired or dangerous information; the second that tends to leave the students free to discover information and to develop critical abilities regarding good and bad content matter. This second attitude is present among the majority of educators that strongly believe in new technologies. They want to bring to light the numerous advantages that students would have with their application: a large variety of informative sources, improved individual

autonomy and the development of interest and coefficient learning, flexibility in relation to the traditional restrictions of time and space.

New informative methods can be used in a proficient manner in course preparation and in the creation of documents, and as a method of communication, facilitating cultural exchanges, awakening curiosity, and strengthening the motivation and intellectual capacity of students. In regards to communications, more and more classes are developing their own web sites and they participate in exchange programs with other international schools. These kinds of experiences create close cooperation among students and an informal atmosphere of sharing. In this case, the student learns in a pleasant atmosphere and becomes even more motivated.

Besides benefiting students, new information methods make possible more efficient communication between parents, teachers and administrative authorities. Therefore ICT gives schools a real possibility to be better in touch at local, regional, national, and community levels through email, mailing lists, and discussion groups.

ICT will not necessarily radically change educational systems, but integrated with teaching will bring about numerous advantages to all users. Educational goals will always remain the same, but the resource base that is available (radio, television, newspapers, Internet…) may change some of the contents and learning methods, the disadvantages of a mnemonic study exist as well as the advantages of studying where energy is concentrated on development of permanent and lasting self-teaching capacities and the systematic acquisition of useful information in order to resolve specific problems.

1.4 European Projects in the Field of Educational Technology

At the end of the 1970s and the beginning of the 1980s some European Union countries launched initiatives to introduce ICT into teaching. In particular, computer courses were introduced among offered courses, especially in technical and professional institutes. In that period, information technology was only considered in teaching as its

own subject but wasn't considered as a support mechanism for other subjects. In any case, the development of multimedia computers and the increased understanding of the potential of ICT brought about the proliferation of pilot projects and public funding, in particular for the development of educational software.

In September of 1983, the European Community, during a meeting about measures to take in order to introduce IT in education, issued a resolution that encouraged the use of new technology in teaching. During the following years, seminars, conferences, and meetings on the topic multiplied, and in 1996 the Community project COMETT was officially launched, regarding the cooperation between universities and companies in order to develop and update education with new technologies.

In 1990, Eurotecnet was also born, which sought to promote innovative teaching techniques in professional schools. The promoters of the project strongly believed that the intensive use of IT could have a positive impact on training and employment. Later, the Eurotecnet project was incorporated in the Leonardo project. [Eud00b]

1.4.1 plan of action: learning in the information society (1996-1998)

In 1996, the European Commission launched a plan of action called "Learning in the Information Society", the goal of which was to sensitize and diffuse practical learning through new technologies. The plan provided for the implementation of four key concepts: the connection of all European schools to the Internet, the intensive development of educational-multimedia software, the updating and specialization of teachers in the use of ICT, and the diffusion of information regarding the benefits of new types of teaching.

The creation of European Schoolnet (EUN), a multimedia network of European schools, is the implementation of the first point outlined in the plan of action. The Swedish minister of education Ylva Johansson, with the support of all the ministers of education present at the council meeting held in Amsterdam in March of 1997, inaugurated the EUN in December of 1996 at Brussels. The network has been in

operation since 1998 and connects 23 nations (15 from the European Community, Norway, Switzerland, Slovenia, Iceland, Poland, Hungary; Israel and Morocco function as observers). The goal of the project is to encourage the exchange of information and experiences of all those working in the field of education, advancement and culture.

The implementation of the second line of action has brought about the creation, in September of 1997, of a database that includes programs, producers, and developers in the educational field. The other community programs (Socrates in particular) and local governmental strategies regarding ICT have contributed to the implementation of the third part of the plan of action. The launch of a series of activities within Europe, in particular Netd@ys Europe, has created a growing interest towards the application of new technologies at the scholastic level and an increased awareness of the potential of ICT. Netd@ys Europe is a competition between schools, active since 1997, in which an award is given to the best multi-media product for education. The 2000 edition was very important since the initiative focused on a restricted number of topics: European citizenship, cultural identity and diversity, equal opportunity, the world outside of Europe.[Eud00a]

1.4.2 the Socrates program

The Socrates program is based on articles 126 and 127 of the Maastricht treaty, which affirm that "the Community shall contribute to the development of quality education by encouraging cooperation between Member States." Socrates differs from all previous Community initiatives in that it embraces all types and levels of education in one European cooperative program. The goals of all the projects and activities within the program are multiple: to increase awareness regarding European Citizenship and develop a European dimension within education; to promote the learning of languages of member countries, in particular those less common and less frequently taught, to bring about a spirit of solidarity and understanding between peoples; to encourage the mobility of students and teachers, giving them the opportunity to continue their studies in a different Community country. Currently the program is in its second phase of development, which

includes the period of 2000-2006. It's based on accumulated experiences from the first phase (1995-1999), trying to duplicate the successes, all the while trying to bring about a certain number of innovations, especially in the use of new technologies. Due to the mass participation of students all over Europe during the first phase of the program, the funding available to the Socrates program has increased considerably, allowing for the creation of new activities within the program; among these of considerable importance, is Minerva, an initiative geared towards the promotion of "Open and Distance Learning."

1.4.2.1 the Comenius project

Comenius is part of the Socrates program, European project for cooperation and integration in the field of education regarding all levels of education. The project takes advantage of previous local experiences and those of some pilot projects in order to reinforce European consciousness, it is one of the most innovative points of the Socrates program, given that never before has such a vast and comprehensive project been presented regarding primary and secondary schools in the field of education. The project is named after Amos Comenius (1592-1670), theologian, philosopher, and pedagogist born in what is today the Czech Republic. He firmly believed that only through education could humanity express its full potential and live in harmony. Furthermore, he believed in peace and unity between peoples; in this he might be considered among the precursors of the European Union.

The program is outlined in different plans of action, among which the most interesting is that which regards the collaboration of Community schools in a project called EEP (European Education Project). In this part of the plan of action the project promotes, besides the cooperation between schools, the contact between students from different countries, giving them a European dimension to their education and an opportunity for mobility among teachers in order to improve their teaching capabilities. A collaboration between schools is constructed when at least three schools participate from different countries. One of these schools assumes the role of coordinator, in that it works on the global organization of the project, the organization of the meetings between

partner schools, the magazine articles about how the exchange is working, and assures that all the schools respect the deadlines and meetings agreed upon. In any case, even if a coordinating school exists, who is in fact project leader, the project should be marked by a spirit of collaboration, in which each partner has a clear and well-defined role in the development and implementation of shared activities. Even though a minimum number of schools are required in order to create a collaboration, there is no maximum limit, but by increasing the number of partner schools the difficulties involved in the coordination and execution of the project also increase. Each participating school in a European project is encouraged to continue the project in following years and to transmit the experience to other schools, above all at local levels, which have not yet had this type of experience.

Each year the European Community selects different projects and finances them by dedicating funds that can be used for the organization and the participation in meetings with other partner schools, for the development, elaboration, translation, and exchange of materials and experiences between participating schools, and for the improvement of information technologies for communication purposes. Besides financing the project, the European Union can agree upon supplementary scholarships for study visits of teachers and students in the country of a participating school. As often happens, sometimes the funds are not enough to cover the expenses involved, and that limits the liberty of schools to participate that often have no other sources of funding (sponsors, or other institutions…).

Many schools criticized the Comenius project because although well structured it requires a long period of time in order to receive actual funding and a long bureaucratic procedure in order for a project to be approved. For this reason schools often develop projects at European levels, with the same spirit and less paperwork, but without taking part in the project offered by the European Community.

Comenius outlines a plan of support aimed at associations, organizations and groups that work on scholastic education in Community countries. Projects that encourage the introduction of the European dimension in scholastic education are financed, especially ones that do so through preparation, publication, and distribution of materials regarding methods of European cooperation and innovative uses of

informational technologies. The European Union tries to encourage associations active in this field and therefore agrees upon annual funding that covers organizational fees, travel and assistance to a country where work needs to be completed for the project, the use of technologies for communication and material exchanges between project participants, translation of educational materials, and costs involved in closing evaluations of the collaboration.[Eur95]

1.4.2.2 the Minerva project

The Minerva project was born from the idea of a member of the European council during a meeting in May of 1996 about multimedia software. The conclusions of that meeting supported the idea that an increased use of ICT in education was necessary, in order to meet the needs of teachers and students; and furthermore, that new methods had to be brought forth that would take into account the evolution of teaching roles, giving students a more active position and encouraging multidisciplinary approaches, reinforcing the collaboration between active subjects. Minerva seeks to promote European collaboration in the field of "Open and Distance learning" (ODL) and the use of ICT in areas of education. It also seeks to be an innovative means of development of new work methods and European cooperation. The activities supported by the program are multiple: the development of educational materials (multimedia and non), planning of new teaching models based on innovative experiments and comparative studies regarding the use of technology within Europe. In order to participate in the program, at least three different institutions must be present from European countries that have already had experience in the fields of ICT and ODL, in which one functions as a coordinator, completing a large portion of the necessary administration, and the other institutions are "partners". In any case, every institution must guarantee its active participation and contribution to the project. The European Commission selects proposals and provides funding for a period of one to two years. In particular cases, funding can be extended for up to three years. [Eur00a]

1.4.3 eEurope (1999-2002)

The global project eEurope was started by the European Commission in December of 1999 with the goal of connecting Europe on-line and allowing every European citizen entrance into the information society. The European Council at Lisbon the 23rd and 24th of March, 2000 set the ambitious goal of making the European economy more competitive and dynamic at an international level. This brought about the urgent need of the Union to quickly put to use the opportunities offered by the new economy and in particular the Internet. In order to reach the goal, each head of state and each government invited the Council and the Commission to develop a global plan of action "making use of certain methods in order to openly coordinate using a system based on comparative analysis of national initiatives."[Eur00b]

In response to this responsibility, the Commission adopted a plan of action project on May 24, 2000, that was later approved by the European Council at Feira, June 19-20, 2000. All of the actions described work toward a few principal goals:

- to insure a more economic, rapid, and secure means of access to the Internet;
- to promote the use of Internet for electronic commerce, in administration and transportation;
- to guarantee that, at the end of the study, all would have the possibility to acquire the digital means necessary to participate and work in an economy based on know-how.

The necessity to act in a short period of time proposed the conclusion of all the goals by the end of 2002. The plan proposed as an immediate goal, within the end of 2001, the connection and acquisition of multimedia computers for all European schools. The next year, institutions would have to work to provide training courses for all educators regarding new technologies and Internet. The plan asked participating States for a strong political involvement, to provide adequate financing and to eliminate existing obstacles to the goals to be reached. In the context of the initiative, references are made also to international prospects, since eEurope in itself does not include specific actions in this field. Involvement will contribute to the development of policies that are stronger and more active in the way of the information society at an international level.

Europe must play a more active role in developing a more equal information society that offers just opportunities for involvement to all countries. One of the fundamental objectives of the Union is to close the technological divide between developed and under-developed countries. In order to reach the goal, it's necessary to collaborate with Europe's principal international partners and with the private sector.[Eur00b]

1.4.3.1 plan of action eLearning

The global project eEurope outlines ten smaller programs, one for each public sector that Europe is trying to innovate. Among these, is eEducation, a program with a primary objective of bringing European young people into the digital age. To reach this goal, the commission has appointed the plan of action eLearning that "seeks to allow Europe to take advantage of its strong points and to overcome obstacles that stand in the way of increased integration and the use of digital technology."[Eur01] The efficiency of instructional systems is based entirely on that of didactical methods. In order to obtain the desired results, the introduction of information and communications technologies must be accompanied by a complete reorganization of learning structures.

The plan for years 2001-2004 seeks to mobilize active subjects in teaching and training fields, also the protagonists in social, industrial, and economic sectors to make learning a permanent force within a solid and harmonious society with a competitive economy. The pre-determined goal is that of providing a solution for insufficient capabilities in new technology subject matter and to guarantee greater social integration. The goals are the same as that of eEurope (to connect schools to the Internet, and to connect them to research networks at high speed, guaranteeing the availability of didactic resources in the network for teachers and students, and to support the evolution of scholastic programs), but are integrated to strengthen the commitment to training at all levels, in particular, promoting a digital culture for all and generalizing adequate types of training that include not only technological aspects but also the didactic use of technology.

At a collaborative level among Community countries, a greater level of commitment is needed to reach the goals outlined, based on the success levels seen in the last few years. Furthermore, businesses and banks must be involved in the preparation taking place, so that careful investment planning can be made in this area. The projects must first be studied by experts in the field and then approved by local governments. For this reason, it is necessary to keep the political debate active regarding new technologies and eLearning in particular.

Within Europe, there are three eLearning working groups: one with the member states, one in the heart of the European Commission, and one with industrialists. Since the first inventory of pre-existent interventions brought about by the plan of action, there has been a proven heterogeneity at national and Community levels. Common problems continue to emerge. There is growing recognition of the need to keep innovative technologies within social, economic, and cultural contexts. The compartmentalization among various sectors and instructional levels is greatly discussed, especially regarding life-long learning.

The means that the Union provides in order to achieve the goals are many: in particular Socrates and instructional programs, training for young people. Already since the first generation of the program there has been a notable level of success, and also for the second phase (2000-2006), investments were great, and 10% of these can be dedicated to eLearning.

Since their beginnings, these programs have made possible the organization of activities related to new technologies and to use such methods also for the training of teachers and educators, as proven by a large array of innovative projects and European networks. E-learning represents a priority in invitations to present proposals and there will be a growing number of conjunctive actions launched that regard different projects contemporaneously. Another decisive tool will be the use of European structural funds to support regional development, with the pre-requisite of enhancing local resources first. Among these, the FESR (European foundation for regional development) and the FSE (European social foundation) will contribute to the creation of infrastructure and realization of projects in specific sectors, for example networks for universities, and adequate instructional systems for training.

The plan of action outlines, finally, a series of interventions that seek to respond to some specific problems. The most interesting regards the elaboration of an auxiliary instrument for decision-making. Based upon comparative analysis principles ("benchmarking") proposed by the vertices in Lisbon, quantitative and qualitative indicators have been chosen to build a strategic information base and one for quality control. The analysis is based particularly upon work by Eurostat and Eurydice, but also with collaboration from investigations made by Eurobarometro, and with studies made by an initiative from DG Information Society after the global plan of action eEurope 2002 and with research projects launched by Socrates and TSI. Furthermore the plan will make use of work completed in the area of European employment strategies.

1.4.3.2 evaluating results obtained by eEurope

In February of 2002 the European Community commission issued a comparative analysis of eEurope initiatives, based upon a list of 23 indicators. Within the context of the goal to "invest in human recourses and in capabilities" results came in regarding the diffusion of Internet in Community schools and the use of information and communication technologies in teaching. At the end of the year 2001, 80% of Community schools were online. Given this percentage, it's almost positive that the goal of connecting all institutes within 2002 will be reached. But even so, the fact that a school is connected to the Internet does not automatically mean that students have access, or that it is used for learning purposes. In 10% of the connected schools, the students did not have access in as much as that the network was used only for administrative purposes. Internet alone is not enough: schools must also have proper equipment, and must effectively integrate the use of networks in study programs and help train teachers so that they can efficiently use new technologies.

According to statistical data, there is an average of 12 students per computer that is not connected and 25 per computer connected to the Internet. Half of the computers are less than three years old. One notices however substantial differences between member nations. As far as the methods of connection, narrow band technologies prevail: more than two-thirds of the school connections are via ISDN, the others usually connect

through a normal telephone line. Broadband technologies take a marginal place, even though in some countries ADSL is widely available.

In teaching, only a small number of teachers use the Internet, even if a majority of teachers use the net for personal use. The main reasons given by teachers for not using the web at school are the scarce availability of computers and low connectivity. Inadequate training does not seem to be a huge problem: more than half of European teachers have been trained in computer use and Internet, about 90% of these use a home computer and 70% connect regularly to the Internet.

Compared to research parameters, one sees that there is a small group of countries at the forefront: Denmark, Sweden, Finland, and Holland. A larger number of countries, mostly belonging to southern Europe, are lagging behind in almost all areas. In the midst of night and day differences, the introduction of Internet in instruction remains a priority for all member States and European teachers appear open and well prepared in this sense. The final goal is to make all students digitally literate by the time they leave school.

1.4.4 European Experts' Network for Educational Technology (EENet)

EENet is an independent association formed by institutions and organizations from 13 different European countries, founded in January of 1997. The 13 countries are: Austria, Denmark, Finland, France, Germany, Great Britain, Greece, Italy, Holland, Norway, Spain, Sweden, and Switzerland. The offices present in almost all the countries are near the local Ministers of Education, even if these do not necessarily participate. Other nations have already requested admission to the network, which will surely grow within the next few years.

Work completed by EENet has been officially recognized within Europe in the context of the Socrates program as a complementary measure called "EENet Observe—the EENet Observatory, a basis for synergy and transparency between initiatives at national and international levels in the area of ICT in education." All members of the organization have agreed upon a series of actions and a plan to work together in the field

of information and communication technology for education (ICT). The main goal of the network is to collect, share, and analyze information on developments in ICT and provide advice and educational models to educational directors within Europe and at national and local levels. The members of EENet maintain close ties to other European associations within the sector, cooperating on international projects and exchanging information on important national developments. In order to maintain constant contact the World Wide Web is widely used as a forum for discussion and a center for collecting information (publications, national and international conferences and workshops).

The approach EENet researchers followed in order to explain the complexity of applying ICT in schools is analytical. Three distinct levels appear, but strongly related: the macro and societal level, applied and organizational level, and the individual level. The macro level is that in which governmental policies must be applied to educational materials.

Three imperatives can be outlined, common among the majority of governmental strategies toward the information society. Pedagogic imperative: everyone recognizes the huge educational potential of ICT, which however must be used only under certain conditions. In reality, implementation remains difficult, even if excellent examples of application exist. Educational reform imperative: ICT may be integrated in learning processes only if schools are given greater autonomy, and by updating the role of teachers, the methods of use for digital materials, and course contents. Political imperative: a nation without a plan for technological and informational advancement is considered third-world. Therefore political and social efforts are necessary in order to maintain the prestige of a country in this sector. Cultural imperative: currently there is not a lot of educational software available and what has been developed does not follow the culture and traditions of the country in which it is used. A national market of high quality educational software needs to be created. Technological imperative: the introduction of technology brings about many pedagogical questions about what should be taught with the support of technology and what with traditional methods. This debate began with the introduction of calculators for solving math problems, but now the question is much more complex.

At an organizational level, the school can be seen as a social institution in remodeling phases. All forms of communication are changing and in schools this is seen through the relationship between school authorities, teachers, students, and parents. ICT plays a fundamental role in this case: the use of email for personal communication, mailing lists for information about a particular subject, or discussion groups are only a few examples. At an individual level, there are all the aspects that regard aptitude towards technology. Fear of the unknown and attachment to traditional teaching methods are factors that hinder ICT from fully entering the field of teaching. The effect and impact that belong at this level are difficult to measure or observe: for this reason the work of EENet is concentrated above all on societal and organizational levels, seeking to reduce the complex reality by describing a series of parameters used to observe the development of communication and information in European education.

During the first phase of EENet work, each nation contributed through articles, having a common structure, regarding local situations. In the end, they were edited into a common publication, that sought to bring together the important aspects of all articles, entitled "How learning is changing: information and communications technology across Europe", published in 1998. It was soon clear that a publication of this type was not adapted to the timing and goals of the project, given that educational systems differ from State to State, or even form region to region. The members of EENet soon decided to create an Observatory for the situation, using the benefits offered by the Internet. The Observatory is an archive of information, structured like a matrix, in which the columns are the nations adhering to the project and the rows are the significant parameters outlined by the EENet commission. Ten principal categories were chosen:

- national educational systems
- governmental policies and strategies
- initiatives, programs and projects including ICT
- expenses and funding regarding new technologies
- infrastructure and uses
- training and updating teachers
- cooperation with the private sector
- development of digital contents

- evaluation and research
- practices, projects, and models for schools
- summary

The last category consists of the summary of the progress of all previous categories regarding the use of ICT in schools. Each category contains subcategories that are more detailed in content.

The members of the EENet contribute to the Observatory periodically furnishing information on ICT in education, connecting the article to a specific category. Parts of the publications on the site are public, documents that intend to promote national and international discussion regarding policies followed concerning ICT in education. The decision to reduce the existence of ICT in education into a series of categories and subcategories was made due to the fact that it is very difficult to make comparisons between countries; there are different political systems, teaching methods, training procedures, and different cultural backgrounds.

CHAPTER 2

2.1 The Finnish Educational and Training System

The Finnish parliament decides educational laws and the general political principals to follow in each subject. Then, the government, the Ministry of Education and the National School Board are responsible for the implementation of chosen policies at the administrative level. The Ministry of Education is the highest authority that interacts regarding public instruction. The National School Board is responsible for the development of educational goals, for course content, and for teaching methods for primary, secondary, and professional schools. Furthermore, in order to better administrate at a regional level, Finland is divided into six provinces; each province has a Department of Education and Culture, in which the superintendent is the highest authority.

Each district is responsible for the education of its citizens and is required to provide basic education to all residents. The municipality is also sometimes responsible for upper level institutions, professional and technical schools. The State provides school funding, but outside aid can also arrive from regional levels. Various factors influence the amount of state financing to schools, the most important is based upon student population and the variety of courses offered by the school. In Finland, education is free at all levels. Furthermore, meals are provided for students that stay after school in the afternoons in primary and secondary schools. The government also provides individual scholarships, the amount of which varies from 30-300 Euro per month. This money is used to subsidize a student's study and to pay rent. Moreover, a loan can be provided as an extra supplement at the request of the student. Even travel expenses, if the student travels to school over 10 kilometers, are partially reimbursed by the State.

In Finland, nine years of schooling are mandatory for children ages 7-16. Before seven years of age, a student can receive preschool education, which is provided by institutions in collaboration with elementary schools. In general, about 60% of children begin their education in this way. After 16 years of age, a student can choose to continue

to study or not. For those that continue, the choice can be that of a Vocational school or an Upper secondary school.

Upper secondary schools last three years and usually students in attendance are between sixteen and nineteen years of age. At the end of the course of study, there is a graduation exam, which allows students to continue to study at a University. Vocational schools last two or three years, according to the chosen specialization. After completion of this type of school the student has the possibility to enter a Polytechnical school and/or a University. Vocational schools give students a theoretical foundation, but also certain practical experiences, in fact, there are certain times when they are required to go and work in businesses or institutions. In the educational pyramid, the highest level of instruction is that provided by Universities and Polytechnical schools.

Universities offer the possibility to obtain a Bachelor's degree or a Master's degree, or to continue to study towards a post-graduate degree, a Licentiate degree and a Doctoral degree. In general, a student should complete the first level of degree in three years and the second level within five years. In regards to Polytechnical schools, they provide university level education to students that mostly come from Vocational schools. In general, the completion of a degree at a polytechnical takes three to four years. Since Finland is a country with two official languages, Finnish and Swedish, all levels of education are present in institutions in one or another language. Only a few institutions offer courses in both languages.

2.1.1 upper secondary instruction

In Finland there are two types of secondary education: high schools and professional schools. High schools guide students directly to university studies and seek to prepare them with a global education. High school teaching is imparted in modular courses that last 38 hours each. For each subject, students may have to attend numerous courses before taking the exit exam. Among subjects studied there is Finnish and Swedish, between one and three foreign languages, math, physics, biology, chemistry, geography, psychology, religion, art or music, health and physical education. Some subjects are

mandatory, others are optional. Students are also given some guidance regarding career choice.

As far as how high schools are organized, there are no classes, in the traditional sense. Each student chooses the subjects that he or she wants to take and those in which to sit for the graduation exams; therefore groups are formed of persons interested in that course. The courses are modular, and they take place in certain periods of the year. The students can follow their own learning pace, and due to this they can take up to four years to study and not only three. Only high schools specialize in some subjects such as music, sports, and art, and an entrance exam is also required. It is more difficult to be accepted into a vocational school because of the number of applicants.

Vocational schools are fragmented into a large quantity of different didactic directions. Students choose above all a fundamental course of study among the 25 available, according to the different requirements in the work world. Each required direction is divided into two phases: general and specialization. The first phase lasts a year and the contents of the course work are the same for all students, while the second has a more professional preparation. The specialization phase varies, and can last from one to four years. Students take graduation exams at the end of the study cycle of high school. The test is articulated for each subject, and takes place twice a year, in fall and spring. The graduation exam has an official score and is a necessary requirement for entrance into university. When a student has passed this exam and has taken enough courses, he or she receives a diploma in a graduation ceremony and may wear the traditional white student cap.[Ben97]

2.3 “The National Strategy for Education, Training and Research in the Information Society (1995-1999)”

The first national plan was presented by a commission of experts on new technology in 1994, and the goals set were implemented through the “Information Strategy Programme”, active between 1995 and 1999. The national strategic vision sustained that “Finnish society will develop and utilize opportunities created by new technologies, bringing about an improved quality of life, knowledge, national competition and social

interaction."[Fin99] One of the hopes of the program was to make Finland one of the most advanced countries in the world in the area of new technology. A study in 1997 by the Finnish national Fund for Research and Development (Sitra), conducted on 55 countries, revealed that Finland is classified as the second world power in development of information technology. [Vay97] International comparisons are often difficult to make because there are too many parameters on which they can be based, but without a doubt one can say that Finnish information society has reached a very high level. The commission that created the strategy affirmed that the development of technology would bring about new prosperity to the country, creating new jobs and raising the average quality of life.

2.2.1 results obtained after the first phase

Comparing the Finnish situation with the international situation, one could say that the development of the Finnish information society is going fairly well. The development depends upon, in particular, a few strengths of this society: education and research traditionally at high levels, the presence of companies within the sector among the first in the world (Nokia), the ranking of first place regarding number of Internet connections and cellular phones, and a competitive market with relatively low prices regarding telecommunications. One threat, however, could be constituted from risks regarding the security of personal data and of information technology intruders. The advancement of a high level information society does not come without defects: in fact using technology for all daily activities can bring about, in time, a dangerous dependency. Otherwise, one must keep in mind the dangers that come from a continual bombardment of information, damaging above all for children.

The Finnish government has kept all factors in mind in the implementation of the strategy, meeting the fixed goals in some cases. The second phase of the strategy (2000-2004) will try to achieve some of the remaining goals. Huge results have been obtained by creating efficient infrastructure in the country; the case is not the same, unfortunately, regarding the use of information and communication systems in scholastic education.

According to the final report of the program, "only one fifth of scholastic personnel frequently use new technologies for teaching support. However, almost all students and teachers agree that the use of these resources will increase in the future."[Fin99]

The first national strategy towards technology focused on the acquisition of advanced technology equipment and connecting schools, libraries, universities, and national archives to the Internet. The Finnish government financed the education sector, the updating and research necessary with considerable funding, bringing about good general results; these investments, however, are still insufficient.

Sector	**Millions of Euro**
Empowerment of abilities necessary to enter into the Information society	7,5
Creation of networks as learning atmospheres	6,0
Acquisition and development of digital contents	3,3
Empowerment of structures in the information society in education, training, formation, and research	9,0
Support given to projects and launching of services in the area of research, education and updating; supports systems for public libraries	24,2
Total annual funding	**50,0**

Table 2: Funding of the Finnish Ministry of Education from 1995-1999[Fin99]

2.2.2 the condition of upper secondary schools in 1997

The rapid development of information and communications technologies (ICT) during the last twenty years has had a huge impact on education and formation sectors as well. The discussion on schools of the future began at the beginning of the 1970s when great potential was perceived from the advent of new technologies. Finland has always been avant-garde in this area: the state has encouraged and financed the purchase of computers and the creation of networks within schools since the 1980s. Only since the 1990s, when the Finnish government articulated a special strategy for the creation of an information society, did the investment in new technologies become systematic and of a

notable sum. One can understand the long-term goals of the Finnish government from the fact that while all the other public expenditures were being drastically reduced, more funds were being given to education for the acquisition of computers and the training of teachers.

The scholastic system is very complex: the changes and above all the innovations were assimilated over a long period of time. One could not expect that technology alone could produce immediately visible results in schools. Often workers in the field of education, in particular investors and producers, expected tangible results in a short amount of time, and because of this, big projects failed after a short period of time. The Finnish Parliament recently instituted the "Commission of the Future", with the responsibility of monitoring the situation, evaluating current projects, and increasing the availability of technology to all citizens. In 1997, the "National Funds for Research and Development" (SITRA) worked in this context, which evaluated in a detailed report the impacts of ICT on teaching and learning. The goal of the research is to understand at what point Finnish society finds itself within this "new world" and how ICT can support teaching in a practical way, as well as learning and training processes. The presented report is divided into four sections: in the first, equipment present in schools is illustrated; then, the current role of teachers in institutes and their capabilities regarding new technologies is analyzed; next, the results of studies conducted on students are presented; and finally, the problem of the introduction of ICT in the programming of courses is evaluated.

2.2.2.1 structures present in schools

Statistics show that upper secondary schools, on average, have one computer for every 13 students. There is a certain difference between large and small schools: in the first, students have greater access to computer labs (one computer for every 9.6 individuals) than in the second (only one computer every 18.4 individuals). In the analysis, schools that are considered "small" have at least 250 students and "large" those with more than 250 students enrolled. Regarding Internet connections, the situation is

more positive, almost all the schools are connected. The majority of institutes have a local LAN network and an outside connection like ISDN or a broadband connection. At school, students can use equipment with CD-ROMs in 78% of the cases. 69% of the institutions also have scanners. In some schools there are other forms of equipment such as synthesizers (27%), digital cameras (16%), videoconferencing (12%), and CD burners (8%), but in much smaller percentages. The biggest problem that has been encountered is efficiently maintaining the systems. Computer teachers already have too much work and cannot administrate the labs regularly; there needs to be a larger number of technicians and specialized administrators available.

2.2.2.2 teachers as ICT users

In terms of new technologies, we must consider teachers as the first students, given that the majority of teachers were asked to make frequent use of an instrument still unknown and never used before. For this reason, teachers must above all be encouraged to get acquainted with computers by practicing at home. 83% of educators interviewed said they have a computer at home that they use for work and to prepare lessons. Once enough experience has been gained, the introduction of computers in class would be less traumatic and more natural. Much depends on the attitude towards technology, given that it is often affronted with a certain diffidence. The organization of training courses would help in greater acquisition of understanding about the potential uses of new methods and instruments.

Usually training consists in the introduction of the programs commonly used and the explanation of how to do basic web operations, like research and sending e-mail and navigating the world wide web. After having taking a course however, the majority of teachers report to be satisfied with the level of ability reached and approve of applying ICT to education, but unfortunately only a few put it into practice. The majority use only word processing programs that by now have replaced old typewriters, while graphics programs, managerial programs, and those used for basic database organization are completely, or at least for the most part, ignored.

Computers are usually located in laboratories, while they could be useful in other parts of the school building (libraries, classrooms…). 46% of classes, however, have a computer for research and consulting, while the majority of schools have a computer available in the teachers' lounge. Only a small number of schools, however, have converted the traditional library into a multimedia center, where it's possible to find information in one or more of the known forms (paper, electronic, audio, and video) and where cataloging and research are controlled through technological means.

2.2.2.3 students as ICT users

The real consumers of new technologies in schools are the students, that often have sufficient knowledge of computers and how they work, and in some cases, have even more practice and capabilities than their teachers. Young people are very interested in computers, and 83% of these have a home computer and 50% of these are connected to the Internet. Computer labs are also available for those that don't have a home computer. In fact, more than a third of students interviewed said that they have access to a school computer lab during after school hours. There is also a noticeably greater interest on the part of male students in using computers as a past-time activity or hobby, other than just for school work, in comparison to female students that mostly use computers to study. 60% of students said they were enthusiastic about using computers at home for homework. 2% of those interviewed even said they use workstations for more than six hours a day.

In an attempt to understand the reasoning behind the preference of traditional methods in comparison to technological methods, the most common answer was that people feel alienated by using new technologies because they discourage manual activity and do not help inter-personal relationships. On the other hand, who understands technology knows that expressive capabilities can take on totally new and stimulating dimensions. Video-writing is a field in which computers have already found wide acceptance and use: only 10% of people working in the area said they prefer writing by hand, while 40% said they prefer technological means for composing.

The enthusiasm young people have towards computers, especially among males, is demonstrated by the fact that many of these hope to someday have a career connected to information technology: 40% of males and 7% of females held this view.

2.2.2.4 using ICT in scholastic programs

The use of information and communications technologies in schools is still a factor that depends totally on qualifications, interest and will of the teacher; in 96% of schools the introduction of ICT in classes depends upon these factors. New technologies are still not completely credible: three teachers out of four agree that "information and communications technologies have not changed teaching and learning in my school." On the other hand, the majority of teacher (68%) considered the use of new technological methods for developing a greater understanding amongst students about phenomenon that happen outside of the school a positive means and a solution more independent and original than practical problems ("problem solving").

When the use of ICT was analyzed as a method for collaboration and cooperation, a conflict arose between principle theories and practical applications. 63% of teachers affirmed that "ICT is a proper instrument for cooperating with others" but only 22% of these put it into practice. Even the school was somewhat responsible for the scarce results in this area: the majority of schools (66%) had not yet created a plan regarding the introduction of ICT into offered classes, even if some of these (46%) have set a minimum standard for students and what they must learn during their school years regarding the use of technology. The majority of schools (64%) offer computer classes to their students, but only a small portion (26%) defines how technology should be integrated as a support instrument for teaching.

This data, fairly discouraging, seems primarily contradictory considering the efforts made by the Finnish government through the multi-year program "Finland towards an Information Society". The majority of schools adhered to this program in order to obtain funding for modernization efforts, with the motivation, in almost all cases, being that of

buying computers, of developing local networks, and connecting to the Internet. The introduction of technology in teaching would have only been the next step. The sporadic use of computers regards above all word processing: 85% of the schools use it every week and only 3% affirmed that they have not yet introduced it consistently. More common was the navigation of the World Wide Web for educational purposes (60%) and the use of email (55%). Regarding the use of other computer programs, the situation is even more discouraging: 25% of schools use graphics programs, 5% use musical software, 10% use programs for databasing, 15% use applications for language learning, and only 2% use collaborative work programs.

2.2 The National Strategy for Education, Training and Research in the Information Society (2000-2004)

On December 21,1998, the Finnish Minister of Education selected a work group that had to prepare a new national plan for education, training, and research for the five year period of 2000 to 2004. The new strategy was divided into three sections. The first presented an evaluation of results obtained with the first plan during the period of 1995-1999 and projected possible outcomes in 2004. The second part concentrated on the current situation and the necessary previsions for the next millennium, while the third introduced the chosen plan of action in order to reach the goals listed in the strategy.[Fin99]

2.3.1 towards the society of the third millennium

The second national strategy (2000-2004) for an information society was based upon a vision that states that "within the year 2004 Finland will be one of the leading societies in the world based upon education. The success will depend upon equal opportunity in education and development of the culture guaranteed to all citizens, using

extensively technological resources and educational services. A high quality model will be put into place for teaching and for research based upon network connections."[Fin99]

In order to realize this kind of a society, everyone must be capable of efficiently using new technologies. The principle of "lifelong learning" must be applied to the entire educational system, in order to motivate the population to process, analyze, evaluate, and eventually utilize the opportunities offered by technology. The network must present valid opportunities for teaching and for learning, including programs to be used during lessons as support for traditional teaching methods. Close collaborative efforts between the public and private sector are necessary to produce the contents: research, above all at the university level, must be the basis upon which industry develops and distributes educational programs, as commissioned by the government.

Finally, valid digital contents and high quality programs will be used by teachers, a role which must evolve compared to that of the past. Their role will be that of introducing new media in teaching and creating stimulating learning atmospheres for students. The job is not an easy one, above all because these same educators often lack the computer training necessary that they need in order to innovate classrooms and also probably because they are already experts in traditional teaching models. This can create a lack of motivation to introduce information and communications technologies in schools. Once again it is the job of the state to provide; to create training courses for all teachers, encouraging them to use new technologies. To this end, the community of Helsinki has already put into practice the guidelines of the strategy, giving portable computers to all teachers able to prove their abilities and intentions to use new technologies.

Students must take on the responsibility of learning not only in the classroom, but also outside of school. Traditional places of learning, school, home and work, verge together towards a global place of education. In school, students will be instructed by teachers, at home by the family, and at work by a boss, but it will be up to them to choose their own learning path and to develop appropriate abilities.

Technology can greatly support learning, because it allows natural limits of time and space to be overcome. By having the possibility to access informational resources at any moment, the possibility to satisfy the thirst for knowledge in any place or time also

exists. However, one should not think that this means that everything will be based on individual knowledge or based on individual interests; knowledge sought will be relative to a specific problem to be solved and collaboration with others will greatly help in reaching a rapid solution.

Big incentives must be given to "distributed information": groups of people, each with a partial view of the problem, and probably, with part of a solution, brought together to find a common objective. One example is the operating system Linux, invented in Finland by a brilliant young university student, Linus Torvalds, and now developed, maintained, and updated by thousands and thousands of young technicians all over the world, that collaborate through the web. The software, a brilliant piece of individual genius, gained a name for itself and a portion of the market, becoming a dangerous competitor to Windows, multi-advertised product of the American multi-national Microsoft.

2.3.2 updating educators

One of the key points of the Finnish strategy is the updating method for teachers and the collaboration of institutions and training centers. The starting point is the fact that only one-fifth of teachers uses information and communications technology during school hours, while two-thirds of teachers consider their technical training inadequate. Raising the average level of computer literacy is therefore a first priority, in order to later focus on pedagogical uses of new media. The topics of training are numerous: one must take into consideration the different learning and study environments, distance learning, the continuous development and evaluation of cooperative work and how to obtain, manage, and arbitrate information.

The government requests that the responsible sectors supply teachers with the knowledge and abilities necessary in the information society and recommends a gross investment in development of innovative pedagogical uses of ICT. Furthermore, the Ministry of Education promises continuous financing to these projects, keeping an eye on projects presented by university departments and preschools. The government is not the

only entity that supports the renewal initiative, but works together with the "*National Board of Education*" and the national television company YLE.[Fin99]

2.3.3 the active participation of students

The Finnish government believes in young people and their abilities to master new technologies, so much so that they have dedicated part of their strategy to students. Students were born with technology and have always lived along side it, making technology an integral part of their lives. Adults have lived part of their lives without new information and communications technologies, and have had to get used to using technology only after being overrun by their existence in daily life. For this reason, it's not surprising to find that an adolescent knows how to use a computer better than his parents, and that they have to ask his help every time they talk about technological instruments. This situation, common in many families, must be made productive within the school environment, without making teachers feel inferior. Students must be given the possibility to take active part in the school through assigned activities, both graded and non. The Finnish national strategy refers in particular to the administration of local networks, an undesirable task for teachers who are already overloaded with work, but a task that could be stimulating and developed with enthusiasm by one or more students. In exchange for their abilities they could be given annual scholarships or their work could be converted into school credit.[Fin99]

2.3.4 the contents industry and the importance of libraries

In recent years, the electronics industry and Finnish electronics have rapidly developed. This sector has become one of the most important, above all in exportation. The industry will require about 30,000 new employees before the end of 2002. Simultaneously, the contents industry is also growing. A thousand new jobs will be

created within companies operating in the production of new media. These products are often produced in many languages, and one of the areas that is increasingly emerging is language technology, that is developing alongside the technology industry, above all in a small linguistic area like Finland. The growth of electronics commerce will have a dual effect on the job market: some positions will disappear due to computerization, while the electronics market will require new professionals that know how to combine technical knowledge, economics, and administration. In order to satisfy the new needs of the market, the Ministry of Education launched a five year action plan in 1998 for education and training in the field of electronics, telecommunications and information technologies. Furthermore, even universities, polytechnical schools and specialization schools must continually maintain and distribute updated information regarding the training of professionals. [Fin99a] Moreover, within the ministerial program, there was also the need to digitalize all Finnish literature produced, that then would be made available to the entire population. Alongside of digital development, major investments would need to be made in order to prepare and update state archives and libraries, which have always held a high level of importance as places of learning. Today, with network connections, their function must evolve with technology.

At an international level, Finland is one of the leaders in library use, considering the number of books checked out annually per person and the number of those connected to a network. The connection of all Finnish libraries became a reality with the implementation of the "*Information Society Programme*". The goal of the innovation was to guarantee every person access to the library and its contents, in any form. Furthermore, it secured the right of every citizen to use the library for network research and to produce and publish materials on the Internet.

2.3.5 virtual schools and virtual universities

"In Finland, many universities and institutions in the field of education work together on education and distance research, whereby even companies are involved. Later this will be talked about as virtual schools and universities." Learning must take place in an environment that is as similar as possible to the work place of the future.

Today and tomorrow the work place will require extensive use of information and communications technologies and an aptitude for learning on-line.

Due to large distances and small populations, educational centers in Finland are relatively few and are spread throughout a very vast territory. This causes prices to rise and creates an obstacle to cooperative efforts. Computer networks offer new opportunities for the support of communication and collaboration. Furthermore, virtual studies give Finnish students that live abroad an educational opportunity as well.

The concept of virtual education can be implemented at all levels of education. At the university level, for example, virtual methods guarantee a more flexible opportunity to study and the possibility to create a network of associated researchers and individuals with the same interests. The virtual university is based on the educational principles of open and distance learning. In this way, students have a better chance of completing their studies and the opportunities offered by new technologies in the way of updating course content must also be considered. The development of distance learning should not take away from the advantages of traditional educational methods that should not be completely forgotten, but integrated into a new method that offers a vast array of solutions, all equally valid.

Distance learning is closely connected to the development of digital materials, available on-line. Enormous investments in one area and less in the other will not bring about positive results. Besides the possibilities offered by the internet, there are other innovative study methods that take advantage of broadband technologies, new multimedia cellular phones and digital television.

2.3.5.1 an example of a virtual school

mauri.edu.hel.fi is a good example of a virtual school used by many superior schools in Helsinki. Teachers can create classes on the Internet; they don't need to have a lot of training to make a class available on-line; they just have to know how to write an electronic document and to publish it on the Internet. Students can take part in the classes and receive credit for completion of a course. An example of using technology is in a

philosophy class, but the same process could be used for any subject. The teacher publishes weekly a philosophic question; students are encouraged to write their opinions and to make their ideas visible for others through information technology. The publication follows the model of group discussion. In this way debates can occur in which every participant can add or correct something. The teacher acts as a coordinator and a supervisor of the situation, assigning a grade to each student according to his or her ideas expressed and participation.

According to the teacher's opinion, the system is much more powerful and flexible than old methods of interrogating students. Each student can reflect calmly on the topic proposed, gathering information and writing down individual opinions; the possibility of writing and not speaking encourages students to voice their own ideas to others more so than if they had to speak in public. In the end, an electronic archive is available of all the ideas and topics covered. The teacher can use the archive for ulterior discussion and any student can read it, adding comments or simply for curiosity. The teacher can measure the growth of the student in the subject, by re-reading all of his or her comments. In this context, one can't be 100% sure of who wrote the comments, the same student or another person, but the system is not studied only as a means for grading students but as a critical means of educating, evaluating opinions and personal initiative. Furthermore, the grade does not depend entirely on the discussion group activity, but also on a written exam and in-class activities.

One limitation could be that the activity requires each student to have a computer connected to the Internet at his or her disposition; students without home computers have to complete all the given work at school, while others could complete research and work at home, with more time available. The teacher, besides the traditional knowledge of the subject matter, must have a good sense of judgment and must spend a lot of time supervising the discussion group. Furthermore, he or she must be very flexible in order to adapt to new learning environments as this one.

2.4 The Current Situation

In order to analyze the current situation regarding the insertion of information and communications technologies in teaching, two questionnaires were prepared, one for teachers and one for students (see Appendixes A and B). Then, the questionnaire for teachers was sent via email to all the upper educational institutes in Helsinki, twenty-four, and to a few sample Finnish upper educational institutes, selected by region, size, and language. The second questionnaire, that for students was used as a basis for interviews later on at the school. Three main regions were found in which parameters varied greatly: the South, the Center, and Lapland. In Finland there are two official languages, Finnish and Swedish, in some schools the official language for teaching is Swedish but the majority use Finnish.

Seven schools were also visited for one school day, according to the availability of personnel and space in the didactic areas. Interviews were taken with presidents, teachers and students regarding the common theme of new technologies in teaching. In all the schools visited it was possible to sit in on lessons where the computer and new medias were used as didactical support. All of the schools that participated in the initiative showed serious interest in the research and a lot of availability in contributing to the improvement of the current situation.

Sixteen questionnaires, complete with all the necessary answers were returned, with these a qualitative analysis was made, comparing the results with the more general results obtained by similar bodies of research done by the national statistics institute.

2.4.1 results of the questionnaire

The questionnaire for teachers is divided into different sections: the first part seeks to obtain general information about the school in order to classify it according to the number of students, teachers and laboratory administrators. Regarding the scholastic population, considering that Finland is a scarcely populated nation, it seemed useful to consider the size of the institutions, classifying schools as small if they have less than 120 enrolled and the rest classify as large. The number wasn't chosen at random but was

suggested as a reference number by the Association of small Finnish schools, the president of which is Jukka O. Mattila, from Paraisten Lukio, that in the past conducted similar informative investigations.

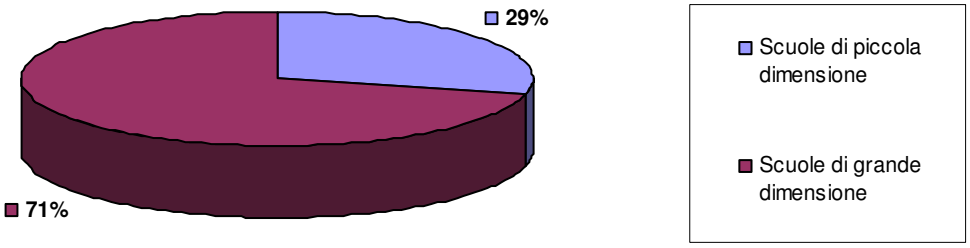


Fig. 2.1: size of schools that responded to the questionnaire

Information on the number of laboratory administrators and technicians is especially useful since, if compared to the size of the school, shows a certain lack of technicians that proves to be one of the most common obstacles to the widespread use of technologies in teaching and learning.

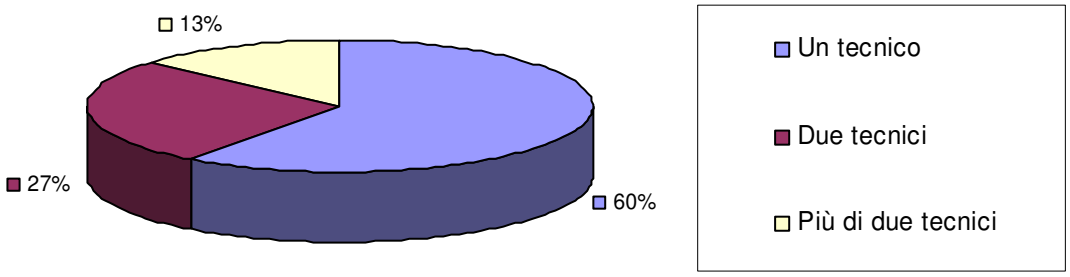


Fig.2.2: number of IT technicians present in the school

By counting on the availability of only one technician, this often means that the weight of the work is put entirely upon the computer teacher, who already has to maintain his or her own didactic activity and help out other teachers.

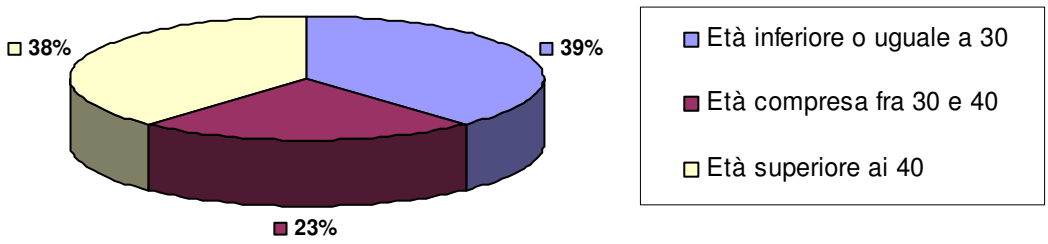


Fig.2.3: Average age of computer teachers

Finnish computer teachers are rather young: a good 62% are less than forty years old, and 39% are under the age of thirty. Age is another important factor in this area: often it is more feasible to find a young new graduate specialized in this field rather than to update a teacher with many years of experience with traditional methods. The overwhelming majority of computer teachers are male (75%), which demonstrates how computers are fascinating and interesting especially for males.

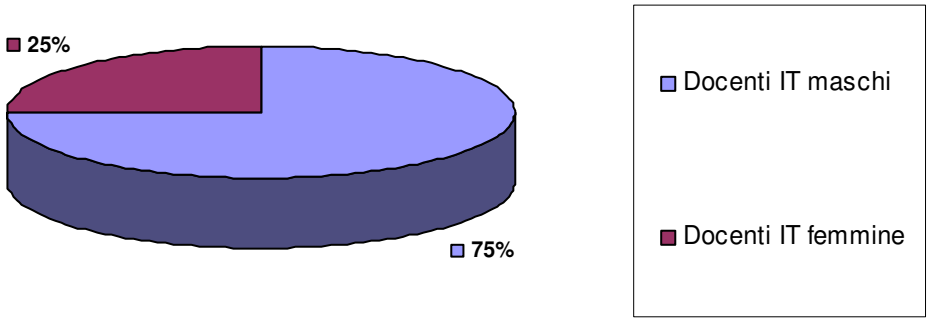


Fig. 2.4: IT teachers divided by gender

Even if the number is growing with respect to past years, many institutions still do not have a computer teacher: often times it is the math or physics teacher that teaches the basic concepts on how to use a computer.

2.4.1.1 infrastructure

One of the priorities in the first Finnish ICT strategy was the creation of infrastructure. The capital invested was useful in buying computers and the creation of local networks. It's noticeable from the student to connected computer ration that the objectives were met: only 13% of the cases have a higher ratio than ten students per computer, while 33% of the institutions have a ratio lower than five.

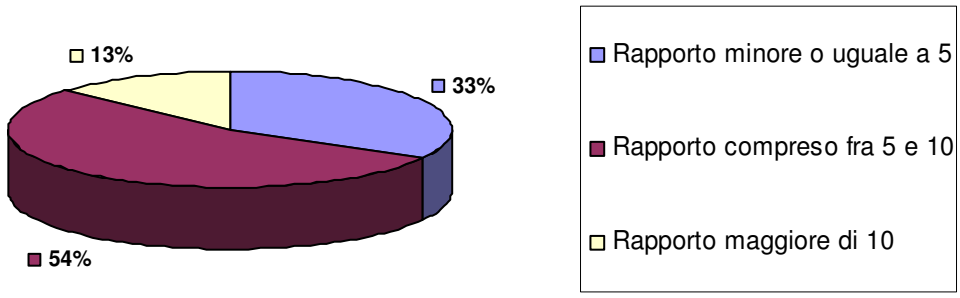


Fig.2.5: distribution of the student/computer ration in Finnish schools

Besides computers, each institution has a printer, scanner, cd burner, and digital cameras. Other technological equipment includes web-cameras that are widely present (57,1%), and a growing number of schools also make laptops available for didactic purposes (14,3%).

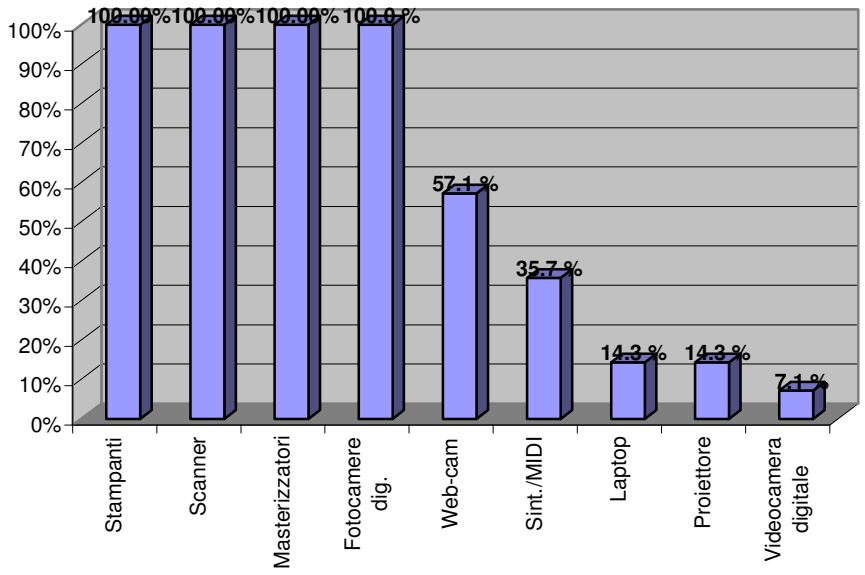


Fig.2.6: available computer equipment in schools

Among the operating systems installed, Windows surpasses all others, Linux is next. Among these, Windows 98 (71,4%) and NT (64,3%) are the most noted, while ME doesn't have a lot of success, present only in 35,7% of the schools. Macintosh systems, used above all for pagemaking and video making, are installed in 14,3% of the schools.

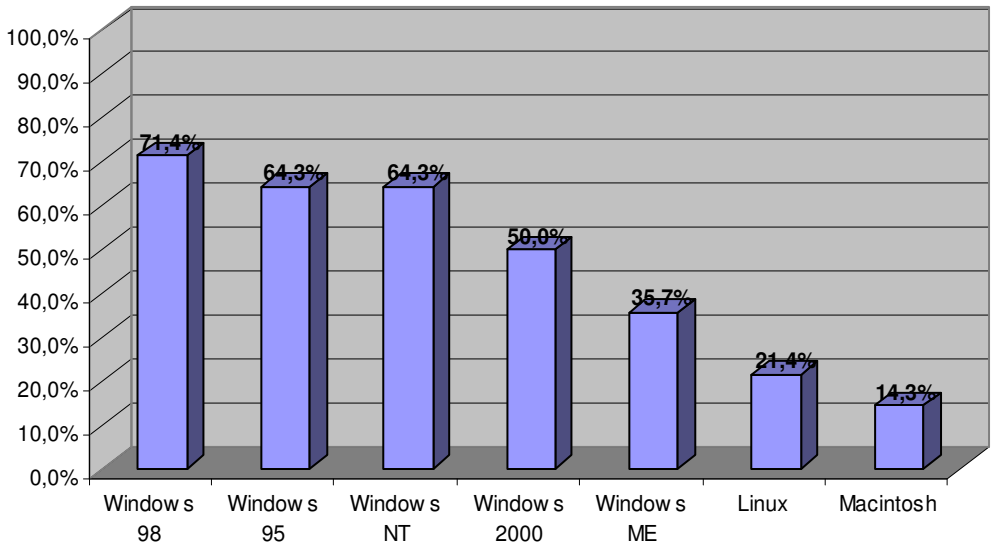


Fig.2.7:operating systems in schools

The best results would be to have the possibility to use various work stations (Windows, Linux e Macintosh), according to needs, with a good Internet connection and

the possibility to use printers, scanners, digital cameras and synthesizers when necessary. Finland has always been at the forefront of network connections, present in many institutions since the beginning of the 1990s, and therefore it's not surprising to find that today all of the schools have access to Internet. Regarding the type of connection, 14,3% still use a modem, but the majority have switched to broadband (64,3%).

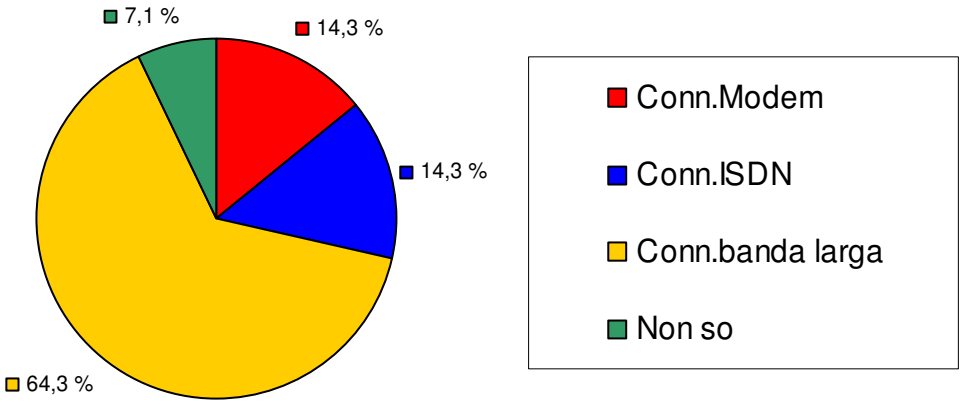


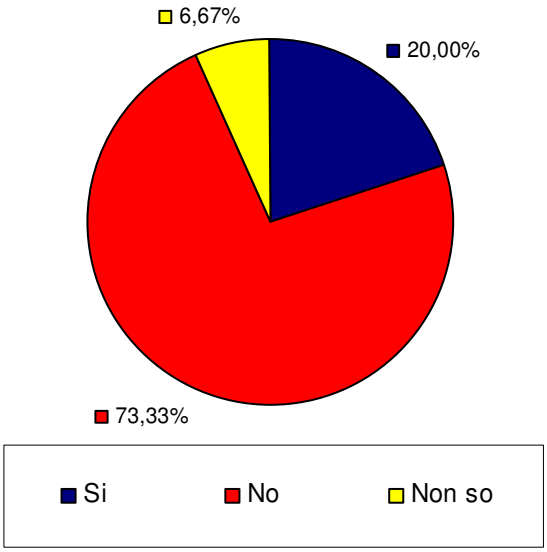
Fig.2.8: Type of Internet connection

2.4.1.2 classes and school policies

Technological infrastructure does not serve its purpose if not accompanied by a project to insert it into teaching and policies that sustain its use in as many ways as possible. These decisions are made by heads of institutions and to be put into practice teachers must consent and be enthusiastic about the idea.

Teaching computer science as a subject is deemed important, and is present in 78,5% of schools interviewed, even if only 7,1% of these use computers only during that class. Course content is often tied to the knowledge and interests of the teacher, some focus on the knowledge of programming languages, others on the theory of computers, others on specific programs. In this way, at a national level, the information that students receive is too divers and too dependent upon the motives of the teacher. Numerous plans, one of which is the national plan, encourage the creation of a scholastic program for computers. Until now not all schools agree but there are a growing number of schools that are planning courses, complementary or in part, to the ECDL modules. The idea of

the ECDL began in Finland, with the CDL certification that one could obtain at hundreds of schools. Now, with the conversion to the ECDL only a few of these (20%) are qualified to be test centers, but in a short while many will be equipped.



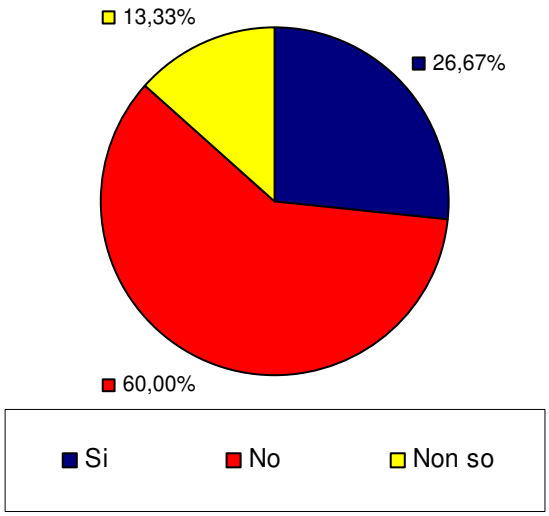


Fig.2.9:computer courses to follow ECDL *Fig.2.10:possible to take ECDL test at school*

Numerous studies and bodies of research show how computers can be used as a transversal instrument in teaching. The questionnaire shows that in half of Finnish schools new technologies are being applied in all subjects, while in 28,5% of schools, only in some subjects.

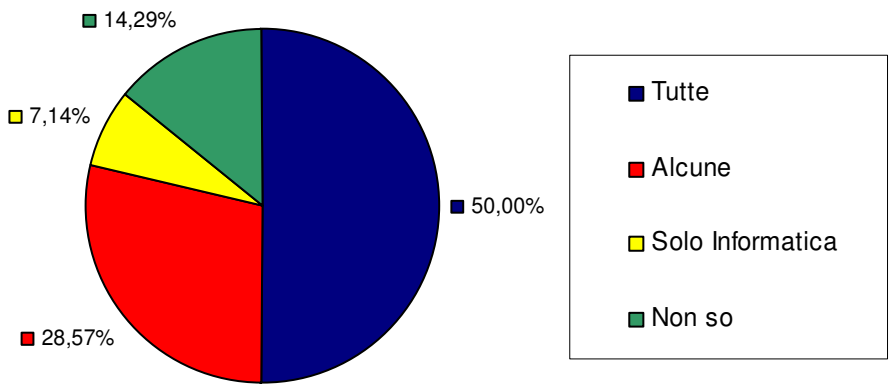


Fig.2.11: percentage of ICT use in all subjects

Among the subjects that make the most extensive use we find language (73,33%), math and physics (60%).

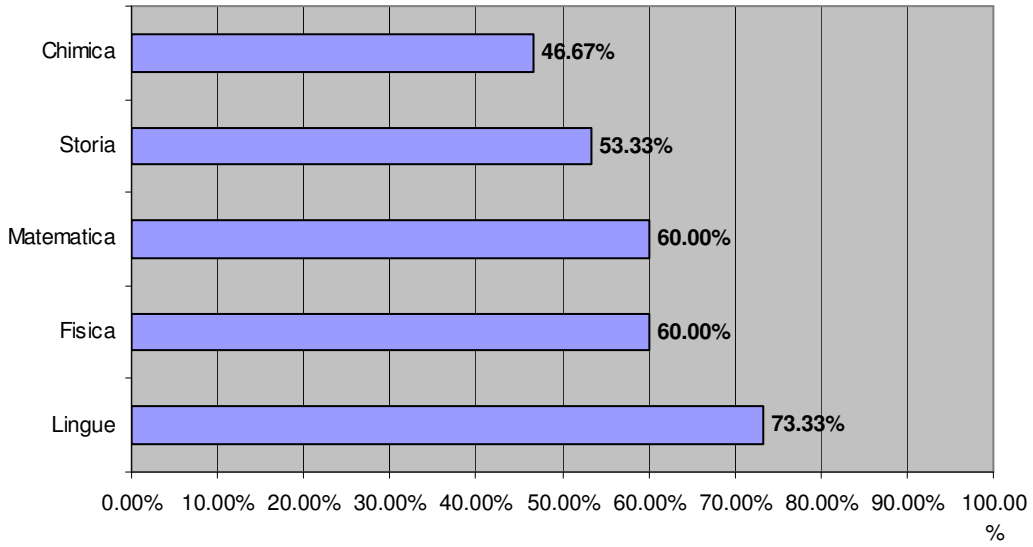


Fig.2.12:subjects that use ICT

Applications of computers in teaching vary, the most used is writing documents on the computer (42,8%), group exercises (42,8%) and researching information on the Internet (28,5%).

One of the most enticing characteristics of the use of new technologies in Finland is the presence of multimedia equipment in classrooms; televisions, VCRs, projectors, overhead projectors, and computers. The last of these can be used at the discretion of the teacher, but also by students, to check email, to do research or modify documents.

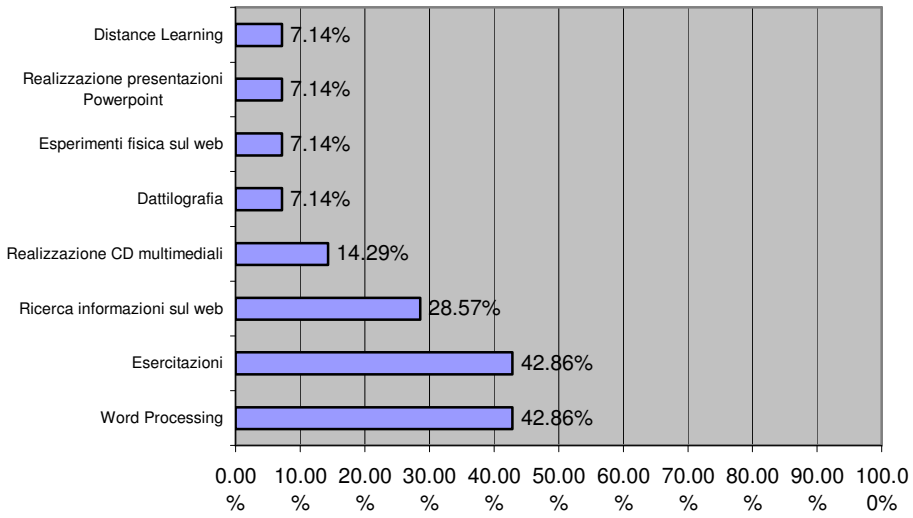


Fig.2.13: Teaching applications for computers

Outside of the classroom, there are also multimedia computer labs, these are often freely available without limits (42,8%) or they require signing a private contract (21,4%). Only in 35,7% of the cases is the use controlled by a teacher.

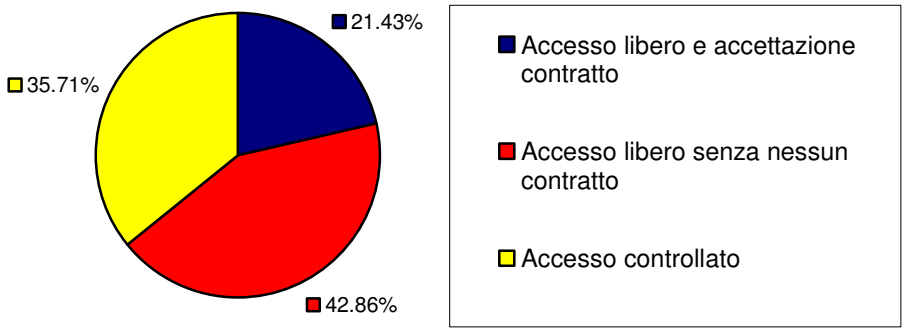
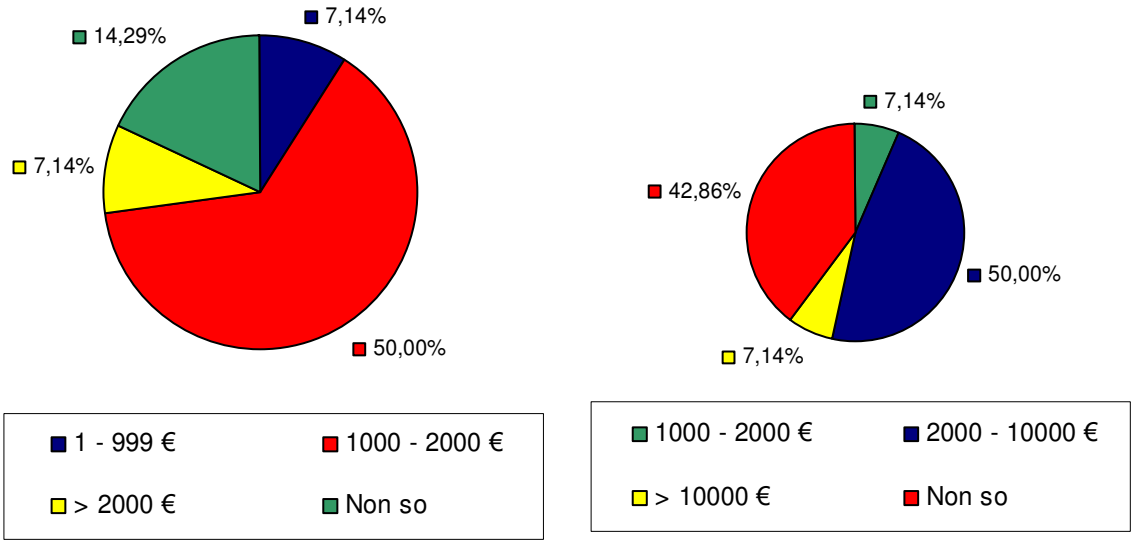


Fig.2.14: Computer lab use policies

It is thought that allowing for free use of the computers by students encourages their creativity and freedom of expression, while at the same time, they must be responsible users and be educated on proper behavior and risks. This type or preparation is fundamental, and must be considered on the same level as practice on computers.



Figg.2.15 e 2.16:Annual budget for buying software and hardware

On average schools have between 1000 and 2000 euro per year to buy and update programs and less than 10,000 euro to renew computer hardware. The budget reserved for projects where new technologies play a key role is varied according to the activity (28,5%), even if in some cases these projects consume a part of the budget (28,5%), but it is not usually more than 2000 euro (21,4%).

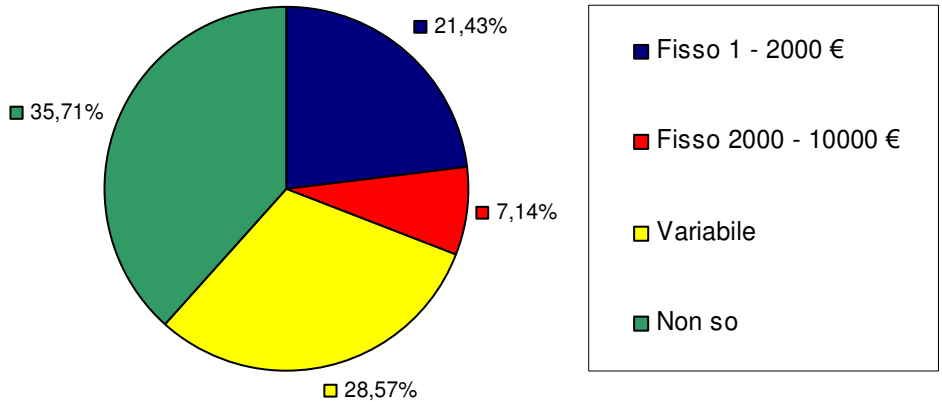


Fig.2.17: Annual budget for projects and teaching activities

It was also interesting to investigate the differences of participation and profit produced correlated to gender and the behavior of students during activities in which computers were used.

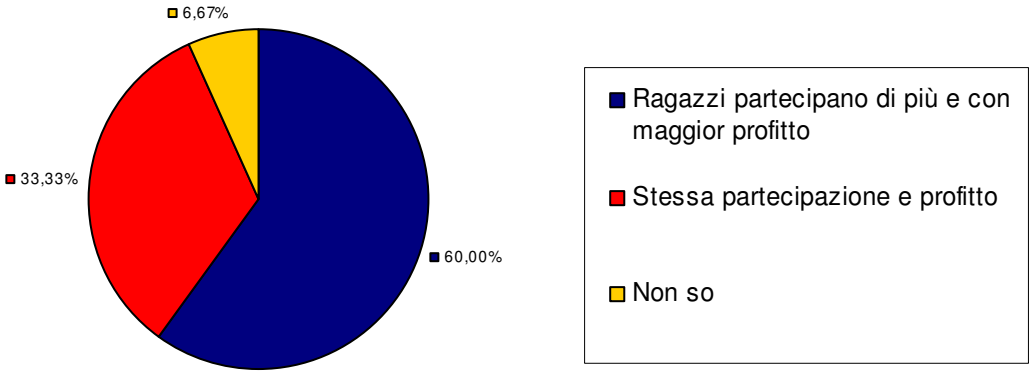


Fig.2.18: differences in participation and profits between girls and boys

Males were judged to be more active in participating and with better results in comparison with their female colleagues by 60% of those interviewed, while behavior is generally good, there were no mentions of habits common in other countries of disturbing

the work of others. Students were judged to be concentrated (40%), creative (33,3%) and motivated (26,6%).

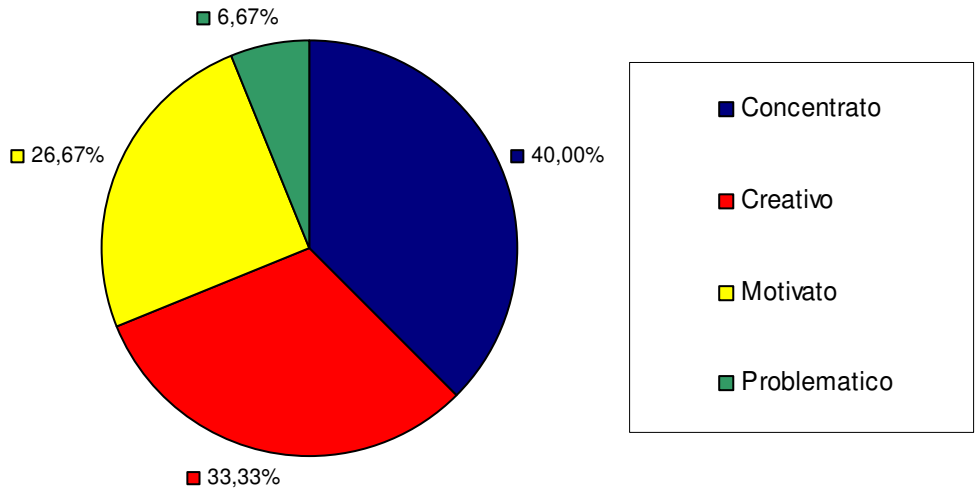


Fig.2.19:behavior during computer activities in class and the lab

2.4.1.3 projects and new technologies

The last part of the questionnaire dealt with the school projects that were done with the support of technology. Among these, the most common was the realization of the school's web page (73,3%), of personal pages and the production of a school newspaper (40%). The big opening towards Europe is demonstrated through participation in the Comenius project (33,3%) and in the development of projects that work towards learning foreign languages (46,6%), while virtual schools and distance learning continue to be a growing reality (46,6%) in the Scandinavian country. Surprisingly, none of the institutions cited use of new technologies as a support for disabled persons.

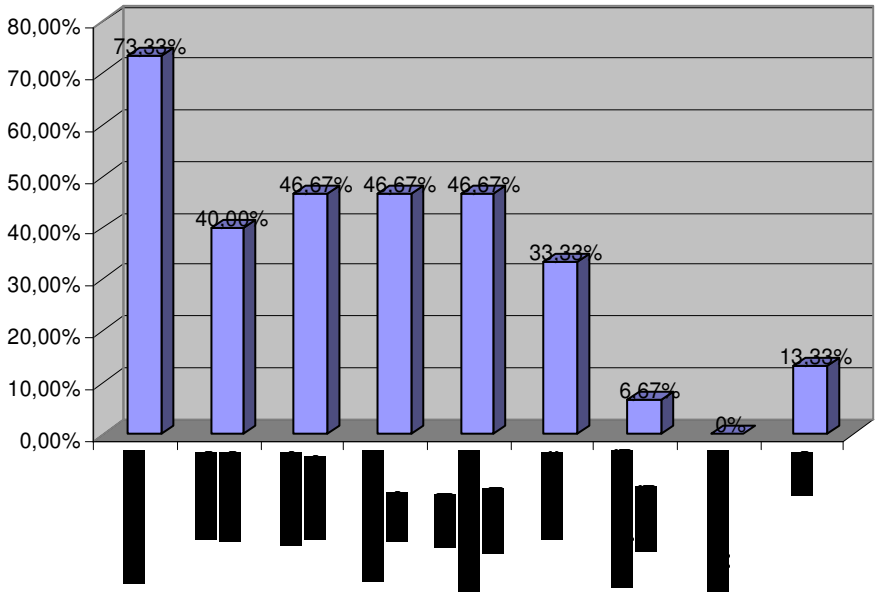


Fig.2.20: new technologies in Finnish school projects

Projects and didactic activities are financed in different ways according to the proposal, but the general tendency is that monies come mainly from the school itself (66,6%) and in smaller amounts, from the city where the school is (44,4%), through efficient civic teaching networks. Only a few projects (22,2%) are financed on behalf of sponsors that are usually big telecommunications companies like Nokia.

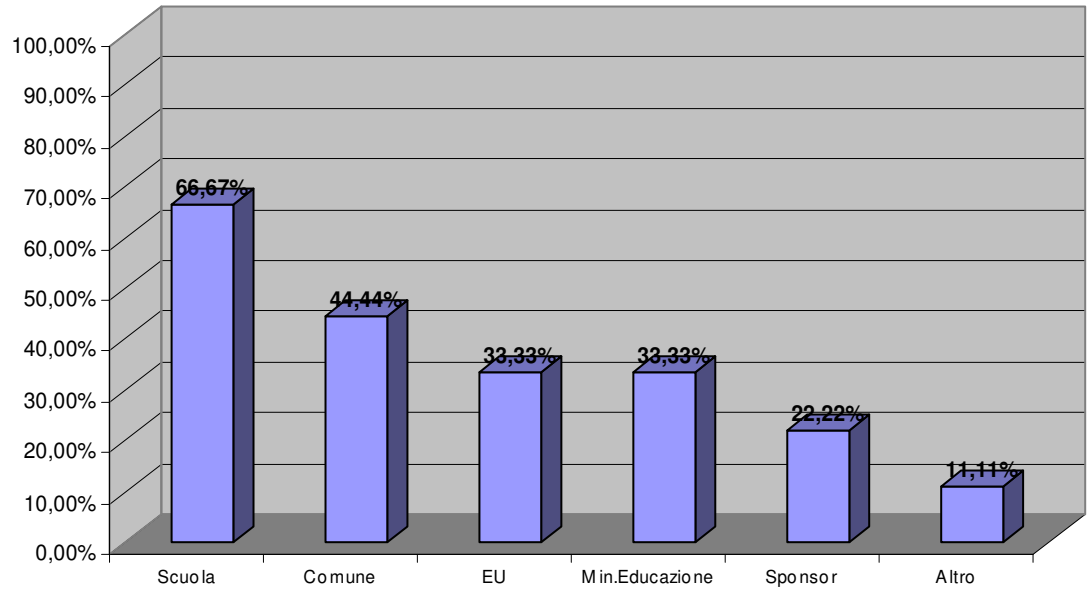


Fig.2.21:ways of financing a project and Finnish school activities

The schools are almost always in collaboration with at least one other entity or institution in order to finish a project. Often they are other secondary schools (53,3%), other times they are universities (13,3%) and televisions (6,6%).

School	53,3%
University	13,3%
Television	6,6%

Tab.2.2: collaboration with other entities and institutions

Rich educational offers is one of the main goals of the project (33,3%), it's useful for students and administrators, in that school funding depends on, among other factors, the number of activities proposed. At the same time, the introduction of new technologies in everyday life, integration, and cultural enrichment are also taken into consideration (33,3%).

2.4.2 visiting schools

Official documents, national and international plans regarding the introduction of information and communications technologies in teaching, are full of interesting ideas, but often the application of these ideas in reality meets with many difficulties, that depend on many factors. These obstacles can be understood and overcome only after attempting to effectuate studies inside places of education. Spending a day in a school, in contact with who is learning, students, or who is teaching, educators, and with who plans, the presidents, was fundamental in understanding how the scholastic system functions and the attitude of individual categories of people towards new technologies, the difficulties encountered, and the successes obtained thus far.

In general, schools appear very organized, orderly and efficient: students spend most of their days there and they have the possibility to eat free at the school cafeteria. The relationship between students, teachers, and presidents is very informal: students call their teachers by name and it's not unusual to find a group of students and teachers talking during break. Teachers can all eat at the cafeteria and they eat alongside their

students, standing in line just the same. Teachers, it seams, do not require particularly formal behavior from their students, they are more worried about their professional and character growth. Teachers have a lounge where they can meet and talk, read newspapers or relax between classes. The atmosphere is very informal here as well, there is always a small kitchen in the room where teachers make coffee, served in personal cups stored in the room. Besides the coffee pot, a fundamental part of Finnish culture, a place is available for the teacher's "school shoes" often times sandals. Each teacher has his or her individual storage space where they place their dirty and often wet shoes once they arrive at school.

These elements cannot be overlooked: they make the school environment very homey, more familial, positively influencing the attitude of teachers towards their work. On the other hand, students often enjoy much freedom inside the school structure. In many cases they can enter all the class rooms, including the computer or audiovisual rooms, whenever they want, without authorization or supervision. According to their interests and needs, they can use the computer or watch television, during an hour when they don't have class. Everything is left to their sense of responsibility: if they break the school rules they will be punished or even expelled. These extreme measures are used in very few cases, and every case has been due to a computer user, pushed by his or her own curiosity or desire to show their abilities, committing crimes via the Internet, downloading illegal materials or violating web sites.

A sense of responsibility and the informal atmosphere makes the students calm and gives them space to express themselves according to their interests. The general attitude of the students is positive: they study what they choose to study, so they like their classes, they can use the school infrastructure freely, without feeling oppressed, and they see their teachers as points of reference that enter on the scene with his or her knowledge and experience when a student is having trouble, but that is also ready to understand the students from a human point of view.

Schools in general are well furnished: each school has a television and a VCR, used by teachers for teaching, and most schools have a computer connected to the Internet, available to the class mostly for research or for checking email. One teacher interviewed said that she would never work in a school in Southern Europe where asking

for a television, VCR, or projector for teaching purposes would cause more than a few problems within the institution. Often times in the teachers' lounge there are hook-ups, where teachers can connect their laptops, to look over lesson plans or make changes to a document.

In all the school hallways there are screens that inform students of daily and future activities in the school. For example, during a visit to one school, all of the students seemed to know that an Italian researcher was coming. Only later did a teacher explain how the screens work, saying that the visit had been "publicized" during previous school days. The screens can also be used by students in case of missing objects or in organizing parties or trips.

Each school has a library, more or less well stocked. Students seem to be interested in reading, checking out an average of five books per year. The transformation of libraries into media centers, as projected in the Finnish national strategy, seems not to have begun yet. In some schools CDs or videos can be checked-out, but libraries are not re-organized as requested. The tradition of old libraries in this case is stronger than innovative efforts, but supposedly in a few years things will change.

By visiting several institutions it's easy to see of the average age of teachers is quite low, about 45 years old. Language teachers and computer teachers in particular are among the youngest, some are not older than 26 or 27. It appears that all of the conditions encountered are favorable to the diffusion and use of information and communications technologies in teaching. Numerous positive experiments have taken place, even if some problems exist as shown by almost all the interviews with presidents and teachers.

2.4.3 interviews with Finnish students

The questionnaire for students included a small number of questions, all pointed at understanding the attitude of who must learn with the use of new technologies. The questionnaire was not filled out physically by the students, but short interviews were conducted at school, trying to select a group of students that were interested in the subject

and that included both males and females. The decision to question students was also made because of the belief that from them we can get simplified ideas, but ideas a lot of potential for the application of new technologies in teaching. Furthermore, students were asked if according to them the computers were used enough in teaching IT, but also as support in other subjects. In the case of a negative answer, the students were encouraged to give their own ideas about how the situation could be improved.

One of the biggest obstacles to the introduction of computers in teaching was found to be a rather closed attitude on the part of teachers. Students were asked to give their opinion regarding the attitude of teachers in their institution. Very spontaneously, students confirmed that many teachers are afraid of not being in control of the computers, even if the number of teachers that experiment with innovative teaching techniques is continually rising. Often, the same teachers feel uncomfortable using computers, for fear that their students will know more than them. The role of who teaches and who learns can come out reversed.

One question sought a judgment on the difficulty level of computer courses: the majority of those interviewed agreed that the basic courses are very simple, and often boring, but advanced courses are fairly difficult and require a fair amount of studying. Students confirmed that in the majority of schools, an email address is given to students, web space for an individual web page, and an account to personally log into the computers. In particular, this last aspect is considered fundamental: if each student could not individually access the computers, there would be no way to identify who is using the computer at any given moment. Identifying who uses the computer is fundamental, above all for security. If technological crimes are committed it is easy to find out who is at fault. The students, aware of this fact, use the computers with greater care. Having personalized accounts requires a local network inside the school, and someone must be available to efficiently maintain and control the network. If one of these elements is missing, the structure cannot entirely work. Another important element asked of the students regards the availability of computers. In almost all the institutions visited, you don't have to wait in line to use a computer, and often times laboratories are open until late afternoon, even after classes are over. In this way everyone has the possibility of using a computer, especially those that don't have a home computer.

The last question regards the use of computers at home by students: almost all responded that they have a home computer and use it daily. The most common activity was for play, or to listen to music, and accessing the Internet, but many also affirmed that they use the computer for homework and to prepare essays and presentations.

2.4.4 positive experiences of ICT in teaching

2.4.4.1 the efficiency and organization of Finnish civic networks

Finnish civic networks are superbly organized. Each municipality, even if only of a few hundred inhabitants, is on line and allows its citizens to access a large number of services. A model example is that of the capital, Helsinki, that is on the Internet as www.hel.fi. The network is organized like a pyramid: inside the principal dominion there are subdominions, each corresponds to a service offered by the municipality. One of these is the didactic net www.ed.hel.fi, run by the "Helsinki educational office", through which all the schools of the city are connected. How it works is that the institution has an email address within the civic network, in the form of name.lastname@edu.hel.fi. The schools can ask for subdominions in order to create their own homepage and in order to give their students email addresses and added services.

Another big service offered by the "Helsinki educational office" regards technical assistance to schools. Two or three times a week, a specialized technician is available at the institution to install new programs, to maintain the network, and to repair broken computers. This way, the school always has an efficient net and computer teachers don't have to do extra work, as it often happens in the majority of other European countries.

Regarding infrastructure, schools all seem to have more than a sufficient number of computers to support teaching activities. Computers are generally available for class activities, while the newest computers are in laboratories. Often there are different computer classrooms according to the use, for example: separate groups of computers with Macintosh operating systems, those adapted to graphics and videos, computers used to navigate the Internet and to write papers, those with Windows operating systems, and

finally Linux computers, used to program. All schools are given a license for basic programs from the "Helsinki educational office": Microsoft Windows, Microsoft Office, Internet Explorer, F-Secure Antivirus, Adobe Photoshop, Adobe Acrobat Reader. The school is then free to buy and install other programs, depending on funds available.

The Helsinki educational office also offers an incentive to teachers who show interest in new technologies. Those that study and pass the necessary exams in order to receive the European computer license, the "Helsinki educational office" gives them a free, for the time that they are teaching, new portable computer so they can also work at home. This help is fundamental, because mastering a computer can only come through hours and hours of practice, and there is not enough time at school to do so. For teachers, there are numerous training courses available at various levels, that are held at the "Media Keskus" a center independent from the didactic department of Helsinki. Teachers request some free days, in which a substitute is provided, and in those days they are trained by specialized personnel. The refresher courses are free for whoever wants to participate.

2.4.4.2 an innovative learning atmosphere for philosophy and history

Juha Savolainen, a philosophy teacher of "Ressun lukio", one of the most prestigious high schools in Helsinki, proposed a very interesting and innovative teaching method. The project began during the 2000-01 school year and is a pilot project. According to its developers, part of the Media Center in Helsinki, the system could be extended to include all subjects taught. The system realizes a new online learning area. Essentially, the game is set in ancient Greece, where students, teachers and external participants create their own character and interact among a myriad of scenes proposed by the system: agora, taverns, thermal baths etc..

The goals of the project are multiple, among these: the improvement of critical judgment and analytical capacities, qualities necessary to play with success and the knowledge of history through simulation and emotional engagement.

Three professors guide the game and propose the situations in which students must use their own knowledge and demonstrate their creativity and originality.

Furthermore, there are virtual characters, that the computer runs, but that are developed by the teachers at the beginning of the games, taking advantage of thousands of pages of history. Among these for example, there is an oracle or a drunk, that when questioned, recites phrases from important Greek works.

An important pre-requisite in order to participate in the game is passing an exam on ancient Greece. Students take part during some school hours set aside for the project, but they can also connect from home and keep playing. The difficult part, underlines Savolainen, is the beginning; the teacher has to write hundreds of pages of script to play the part, to create the scenery, characters and environment. It's a huge amount of work, that requires collaboration with other teachers and students from previous years, who want to participate in the project. It's interesting that the program was developed by programmers, in close collaboration with teachers and pedagogists.

In this area, the role of the teacher is very different than usual; he or she doesn't have to explain anything to the students, only how to play the game, but participates with them in the development in history, trying to stimulate activity and interest of players and creating interesting situations.

The project is inserted within the philosophy and history course and is only part of the course. There are also traditional lessons given in class and exams, necessary to pass the class. Participating successfully in the game guarantees the student a good preparation and helps them pass the final exam, besides giving them a positive impression of their teacher, that follows their improvement as the game continues to develop.

2.4.5 obstacles and common problems

Finland is an avant-garde country in the use of information and communications technologies in teaching, but there are still problems to resolve, above all in the development of high quality software for educational purposes, in making sure that each school has a computer teacher available, and in resolving organizational problems that exist in exchanges with other countries, European and non. One of the most visible problems seen through studies and research is the production of programs for teaching,

especially in the Finnish language, able to follow the cultural traditions of the population. According to Taisto Herlevi, a computer teacher at "Etela Kaarelan lukio", the ideal situation would be that in which only the teacher writes his or her own software for teaching. Unfortunately that would be too time consuming and teachers would have to be specially trained. The same teacher added that "*teachers are forced to use books connected to adapted texts, that often propose the practical realization of what is proposed in the manual. The average quality of these programs is mediocre; publishing companies should make improvements in all areas: interaction, graphic design, increased level of difficulty in exercises, and the possibility to update the program*." Another obstacle is that of the availability of computer teachers; in many schools the math and physics teachers must still teach basic computer use. The Ministry of Education recommends that all institutions have computer teachers, but the situation is improving very slowly. Furthermore, computer course content is based on the interest and knowledge of the various teachers and there is not a general plan for computer curriculum in schools. It would be better if all students had the possibility to receive the same instruction regarding new technology and that all would be able to use the most common programs found in the work world. In this sense, it would be very positive to connect the contents to that of the European Computer License, experimented with for some time, so that if diffused throughout schools it could in fact become the certification of basic computer literacy for all European citizens.

The European Community, above all in the last few years, is promoting the participation in European exchange projects, like Comenius; for the majority of Finnish institutions by now this is common practice. Even though there have been many successes, there are still some criticisms and problems, above all at an organizational level. The "Etela Kaarelan lukio" for example, has participated in the Comenius program for three years, beginning in 1997. Students have communicated individually, mainly via email, with their Italian, German, and Latvian counterparts, for a total of two hours per week, as part of the weekly school schedule. Teachers reveal that they have had more than a few problems finding time and necessary personnel for the exchange project within an already congested school day. Larger problems are due to coordination with other partner institutions, that have the same basic problems and a school system that is not as

flexible as the Finnish one. Considering that there is a one hour time difference between Finland and most other European nations and that these activities often take place in the late afternoon, complications can be so great the there are no communication possibilities between participants in the projects.

2.5 Case Studies

2.5.1 Maailma Tutuksi ry educational framework

One of the cardinal points of European Community policy, as evidenced in the statutes of the Socrates project, is that of financially and logistically supporting associations that operate in the field of education.

Maailma Tutuksi ry, founded in 1992 by Paul Lwoff, is a cultural association that seeks to put in contact, through didactic programs and multimedia products, schools in Baltic countries, Sweden, Denmark, and Finland, with European countries that border the Mediterranean sea, Greece, Spain, and Italy. According to the founder, "*by providing the basis for interactive communication to teachers and students, the idea of a European dimension in education will be consolidated and an increased knowledge of different cultures, traditions, and religions will be possible, the basis for permanently living together peaceful.*"

Finland, a modern nation, is strong in organization of the State, that provides advanced and high quality services to its citizens. Education is free and is for all, no organized delinquency exists and citizens have a large sense of responsibility. On the other hand, no strong traditional culture exists, given that there were six hundred years of Swedish domination and one hundred years of Russian domination. Furthermore, the geographic position, with a rigid climate, strongly influences the character of the inhabitants, rather closed and not very adapt to social life. The big development of information and communications technologies is an answer to the nations chronicle poor interpersonal communications among citizens and the expressed desire to dominate a sector that is not tied to the past but that is pushing towards the future.

Italy, the biggest representative of Mediterranean culture, rather, is the cradle of civilization, with the Roman Empire and having seen the birth of the biggest

developments in art during the Renaissance. The Romantic period was characterized by poets, philosophers, politicians and high quality artists, not to mention numerous wars to obtain independence. Still, Italy cannot live in past glories: Italian design dominates at an international level and the industry produces high quality products (Ferrari, designed in Italy). Unfortunately, however, if the artistic and creative vein is not exhaustible, the same is not true of technological developments and services for citizens, that are at an inferior level of the European average, even if the situation is slowly improving.

The goal of the Maailma Tutuksi ry association is to support educational programs of the European Commission, in particular Comenius and the plan of action "Learning in the Information Society", taking advantage of the possibilities offered by ICT, and in the end to build a bridge between the Baltic cultures and the Mediterranean culture, so different, but also with a good chance of growing together. The association is a member of the "*Council of Education in World Citizenship*" (CEWC), and the "*International Institute of Communications*" (IIC) and the "*World Didac*". The association has taken part in the 1998 edition of Netd@ys Europe, in the area of the network European Schoolnet. The participation objective was to promote the understanding of the potential of new technologies in teaching and learning.

2.5.1.1 the "Mare Balticum -Mare Nostrum" project

Baltic Sea-Mare Nostrum is part of a European program dedicated to developing the idea of European citizenship and to introduce a European dimension in education and in training using new technologies. The program is supported by the "*National Cultural Fund*" of Copenaghen, and the Danish and Finnish Ministers of Education, the "*National Board of Education*" and the "*Svenska Kulturfonden*". The program is coordinated by Finland, with the participation of Denmark and Sweden among the northern regions and Greece and Italy among Mediterranean regions.

A few hundred schools, spread between the five countries have taken part in the project, for a total of 3741 students corresponding to questionnaires published by the association. The beginnings of the project sought the creation of a working environment that would improve interactive communications between participants and that would

create a cooperative network of schools, as well as the promotion of the debate of teaching with information technologies. In principal, the association creates questionnaires, that become the basis for interactive discussion between students; the answers are analyzed by a research institution and put in graphic form. The material is then available to partner schools in digital form, on the web site of the association. Schools are free to use the information as they think best for their own didactic activities, in the form of discussion, essay, conferences, or presentations. In the area of scholastic calendars, the institutes have to find class time that they can dedicate to the project, in order to allow the students to communicate with their colleagues using the Internet portal of the association, where there is a system of interactive communication.

2.5.1.2 the Parainen-Camerino exchange

During the 2001-2002 school year, thanks to the Maailma Tutuksi association, the collaboration between a small Italian village, Camerino, and a small Finnish high school in Parainen was inaugurated. Parainen, a community of 12,000 inhabitants, spreading over 271.6 square kilometers, is primarily a Swedish community (54%) that is mainly supported by summer tourism and the activity of the local calcium cave. Its inhabitants are proud of the fact that their town is the only Finnish town surround by the sea in all directions and that has fantastic views, especially in the summer.

Camerino, a small village located in the Marche region has little more than 8000 inhabitants, and a university, one of the oldest in Italy, as well as its main resource. Its past was glorious: allied with Rome in the second Sannitic war, it concluded a “aequum foedus” with the eternal city, while the ruling class of DaVarano brought wealth and prosperity to the area between the thirteenth and sixteenth centuries. The same is not so true about the present, fraught with the difficulties of the aftermath of the earthquakes and with a constantly decreasing population.

In this context the technological alliance between the two communities is placed, communities that try to find adequate space as innovators in a field that is presently expanding. The Paraisten Lukio, to tell the truth, is one of the most avant-garde schools in Finland, so much so that the student to computer ratio is 3.5, well below the Finnish

average that is about 13. The school is a pioneer in international exchanges: there have been projects active with the United States since 1988, to which Scottish partners have joined, Australian, and finally Italian.

The project has seen various phases of development: in the first, the institutions had to create working groups and find teachers who could follow the projects as tutors. The theme of collaboration was unique and regarded students and new medias, but inside these themes, according to the likes and dislikes of the students, different topics developed on which essays would be written in their native tongue and then a brief synopsis in English. Each group had to set goals and deadlines regarding the quantity of work to be completed, the quality of participation and various personal parameters. The second part of the work was the more interactive part: the students, for two hours a week, communicated through the portal of the association and email, exchanging ideas on the developing topic, interviewing from a distance their colleagues and leaving space for creativity.

In this way materials were collected that were needed to write articles, that in the third phase of the project were written and graphically posted. The process made extensive use of the Internet, which the students mastered. When the two schools, respecting the deadlines, finished their individual work, the work was fused in a multilingual publication, Italian, Finnish, and English, and then distributed physically and digitally. The next phase of the work was to evaluate, both on the part of the teachers and the students, in an attempt to understand if the goals were met that were set at the beginning and, subsequently, what were the problems encountered. The collaboration ended with a cultural exchange between the two schools that had the chance to meet the partners that they worked with during the year and to see a new country, besides improving their language abilities. Surely the exchange created a stimulus for the continuation of the collaboration and its improvement year after year.

2.5.1.3 Aslak and Antonia

As part of the program “Baltic Sea-Mare Nostrum”, the new project for 2002-2003 is "Aslak e Antonia", the comparison between the most northern part and most southern parts of Europe, Lapland and Sicily. The communities used as examples are

Utsjoki, one of the most northern parts of the European Union and Floridia, in the province of Syracuse, in the eastern part of Sicily. The community of Lapland has a population density of one inhabitant per 3 kilometers and the reindeer by far outnumber the human population, which is barely over 1000. The majority of the population has Sami roots, the original inhabitants of Lapland, and today this minority has special laws and privileges. Floridia, on the other hand, has a very desirable climate and is located in an archeological area and is artistically important, where most outside influences come from the Greek period and the Spanish domination of the territory. The basic idea was to offer students from both places the possibility to get to know one another and to be in touch with cultures and traditions that are very different, but that both belong to the European Community.

The project follows the directives outlined in the Community project Comenius. Students get information during school time, when certain hours are scheduled during the week to be dedicated to the project. The students take advantage of interactive possibilities offered by new technologies, in particular using services offered by the association site. Teachers follow the project as tutors, helping students with technical problems or with foreign language difficulties, and by suggesting interesting topics for discussion.

The project is divided into different phases, in the first phase the schools receive two questionnaires, one for teachers and one for students, in which they are asked to answer questions regarding traditions, religion and how the climate influences the day to day life of the two populations. After this, the answers are analyzed and put in a graphic format to show differences and similarities in ideas. Other than the questionnaire, students in the exchange schools are asked to write an essay in English on what they know about the other culture of the students that they are collaborating with. In the end the best essays are chosen, and they are given prizes of trips to the exchange city, hosted by local families. An essential characteristic of the essays is that they must be written with the knowledge they have of the other, without further research. Because of the distance between the communities, often this information is full of stereotypes that come from television, but there is also some very detailed information, that prove the great interest and openness of the students towards other cultures.

The image of Sicily, created by reading the Lapland students' essays is that of a warm region, hospitable, characterized by good food, a strong Catholic religious influence and the presence of the Mafia in political and economical affairs. One of the students from Lapland, on this subject, wrote that " people in Sicily are more open than in Finland. Family is more important for people in Sicily, which is different from us, where it plays a secondary role. [...] There are a lot of pretty girls, that can wear their bathing suits on the beach for several months a year, while in Lapland we have to wear several layers of clothing for almost the entire year."

The Sicilian students considered Lapland as a scarcely populated region, in which winter is cold, dark, and long, characterized by the presence of a lot of reindeer, that are the principal economic resource of the region. According to one student from a school in Sicily, "the majority of the Italian population is Catholic, but I don't think that religion plays a major role in Finland. [...]I'm sure that in Finland people, due to the long winter season, often go to pubs to drink and get drunk, while in Sicily there are more social activities, activities outside, and meetings in the piazza. This makes us more content with life in general and more open to others, while people in Lapland must suffer from depression."

At the end of the exchange, the association produces an educational short film, based on the recurring ideas in the student essays, on the direct experience of the students in the exchange communities, and on the resulting attitudes through analysis of the questionnaire. The documentary is then given out to the schools and put on the Internet, in digital format, to give schools an example, a resource for class, clarification or discussion in class. The cultural exchange between the partner schools must be facilitated by funds made available by Ministries or institutions in the two countries, according to the European guidelines on the subject, but unfortunately the reality is not so positive, and the search for funding for exchange school projects is a critical issue in the whole program.

2.5.1.4 new technologies and cultural exchanges

Exchanges promoted by Maailma Tutuksi are a practical example of how schools can utilize activities of the association. Cultural exchanges are considered fundamental to the cultural growth and professional formation of young European citizens. By learning about realities so different from one's own, it's possible to understand and accept different cultures, religions, and traditions. In this sense, even peace can be realized in a harmonious atmosphere. Furthermore, after the major efforts of past generations that have become reality with the European Union, young people today have the responsibility to consolidate the idea of European identity. Exchanges allow young people to travel, to learn new languages, to meet other young people and to acquire an increasingly international spirit that will be necessary when decisions in the work world must be made. For natural economic reasons, and not for lack of enthusiasm and openness towards the world, young people cannot always travel and encounter new cultures: these initiatives must be supported at an institutional level. The European Community launched Socrates and Leonardo, programs for the mobility of young people that continue to receive a large consensus and number of participants.

At a local level, schools in different member states are entering into the new millennium, characterized by increased computerization and communication. Laws are not enough, the school of the future is made of individuals, enthusiasm and innovative activities proposed by teachers. However, a small risk remains, that of projects being isolated if they are not aided by who has worked in this field for years.

2.5.2 ECDL: a Finnish invention

The "*European Computer Driving License*" is a Finnish invention that dates back to the end of the 1980s. During that period of time, the Scandinavian country was trying in anyway possible to push for the acceleration of the renovation process from an economy based on raising animals and agriculture to one based on industry and the service sector. The growing economic difficulties of the country pushed the government to look towards instruments that could favor the mobility of people and their professional

re-training for a new type of job market. Among various initiatives was the CDL (*Computer Driving License*) project. The goal was to both certify the minimum level of computer capabilities required by the new possible job market and to encourage workers (even those in search of a first job) to acquire computer proficiency, consequently raising the general professional level of the country. Starting from the Finnish experience, in 1995, a group of experts from various European countries, coordinated by Cepis (*Council of European Professional Informatics Societies*), created the program ECDL and at the end of the same year the program was proposed as the ESPRIT project.

In order to manage the ECDL program in its various aspects, in 1996 the ECDL foundation was created, with the local seat in Dublin (Ireland). This foundation is responsible for the central coordination , the supervision, the validation, the updating, and the development of the ECDL program. Each nation is responsible for implementing the program within its own territory and for authorizing centers that can issue the license (schools, universities, agencies...). The European Computer License began as a pilot project in Scandinavian countries, Sweden and Norway, extended then to Denmark, Ireland, Great Britain, and France. In the later half of 1997, Italy, Holland, Austria, Hungary, and Poland joined the project.

On February 4,2001, the European Union Commission issued a long, detailed report titled "Strategies for employment in the information society". In this document, the European license ECDL was explicitly proposed as a standard instrument for certifying basic abilities regarding computer use. The general goal of the ECDL program is to improve the average level of information technology (IT) education and to transmit the basic abilities necessary to use a computer and its applications, a necessity in the international work world. The program is fully credited among those that encourage computer literacy for everyone, which would then guarantee entrance into the information society.

Companies that have invested in the technology field have understood the potential that computers bring to economic renewal, given increased productivity. According to Les Williamson, upper level manager of IBM Europe, "*the benefits of ECDL for IBM reside in the development of an average level of ability regarding each topic. We are seeking a work force that is able to adapt to changes in position and*

developments within the company. To reach this goal, we look for continuous learning." The computer license has a vast potential user basis, given the computer abilities that are necessary in all sectors of the work world. Only in Autumn of 2001 did Finland, the creator of the idea, conform to the new European standard ECDL. [Cds00]

2.5.2.1 the structure of the European Computer Driving License

The ECDL is structured in modules; the first levels transmit basic knowledge on the setup of the computer, while following modules deal with advanced functions of the most frequently used programs. In particular, through the first module that deals with basic computer skills, the candidate learns the way computers work and gets used to technical computer language. Then the uses of networks and program applications in everyday life are studied, with attention also paid to problems and computer security risks. In the second module, concepts such as "files" are introduced and operating systems. The aspiring computer expert must get used to user interfaces in windows and be familiar with basic operations of "file" and "directory": creating, organizing, copying, canceling, renaming, and printing documents. In the next module, the world of word-processing is introduced, how to write documents on the computer. Microsoft word is the preferred program; with this students learn to create, save, write, format, revise and organize documents. Within the course students also learn how to include pictures, images, graphics or multimedia objects in a document. One-fourth of the module deals with spreadsheets and Microsoft excel is the program studied. The candidate learns to create, format and do basic functions on this program. The basic knowledge of data basing (Microsoft Access) is dealt with in the following module. In this case, there are two sections: in the first, the candidate must show sufficient knowledge of creating and structuring a simple database; in the second he or she must learn how to retrieve information from a pre-existent database using interrogation functions. The second-to-last module is reserved for presentations. The candidate uses Microsoft PowerPoint to create, format and visualize multimedia contents. The required skill is that of analyzing the audience and the situation, modifying the type of presentation based on this

information. The last part of the ECDL program is reserved for research and communications. The world of networks is introduced: how to use browsers for navigating the Internet, how to send email, how to research information using search engines. [Ecd99]

For each module of the course, the candidate has to pass an exam in one of the centers certified for issuing licenses. One of these is theoretical and the others are practical. After having passed all the necessary exams, the ECDL Skill Card is issued. The candidate is not required to take all the exams in the same center and can take them over a period of three years from the date of the first exam. The document is now known and officially recognized by an increasing number of institutions, companies, in a situation that is rather heterogeneous throughout various European countries. In Great Britain for example, the Education Minister decided to require all his administrative personnel to take the ECDL exams and the Industrial Minister also requires all directors to take the exams. The Danish Minister of Research and Technology offers a personal multimedia computer at a symbolic price for all professors who are licensed. Up until now ten thousand ECDLs have been issued and an equal amount of courses taught. The German education minister has assured his full support in diffusion of the ECDL in his country and the Commerce and Industry Ministry has found the license to be a method for sensitizing companies to the necessity to raise the qualifications of their workers. Even Austria is at work, developing a refresher course project through ECDL for thousands of professors, dividing them into different groups. Already more than ten thousand professors have been qualified. In the industrial world, Great Britain and Ireland seem to be the countries that believe the most in this project. GEC Marconi, Shell UK, Greenall Restaurants, Ernst&Young, Bank of England, Health Services, Guinness Beer, Northern Telecom are among the names of prestigious groups involved. Also in Sweden, Norway, Denmark and Germany numerous industries have institutionalized the computer license (Siemens, Exxon, Volvo, Ericsson), but the majority of other countries, above all in Southern Europe, appear to be remain left behind. [Did00]

2.5.2.2 the Finnish situation

In 1993 the "*Finnish Information Processing Association*" (FIPA) promoted a research project financed by the Finnish Ministry of Education, on possible uses of information technologies in the field of education. Kari Kyllikki, who might be considered the mother of what would become the European license for the computer, headed the research project. The idea was born from a study on what was the "Computer Driving License" (CDL) that was launched in 1994. The project was given to the "*Finnish Information Society Development Centre*" (TIEKE), an institution that often collaborates with the Ministry of Education.

The Finnish CDL offers various degrees that correspond to various preparation levels: "@-card", "A-card", "AB-card", and the "mobile card". The first degree introduced, in order, was the "A-card" that was awarded to the first graduate by the Minister of Education in person, on January 19,1994.

In order to receive the degree card one must pass seven modules, which consist of a theoretical part and an applied part. The candidate must complete the exam in 45 minutes, answering correctly at least 90% of the questions in order to pass the exam. After passing all seven parts, the diploma is awarded, which documents the modules taken, the contents of the modules, and the software used, the version and the date of the exam. In February of 2002 the 100,000th degree was awarded. It's an impressive number, considering that Finland has little more than five million inhabitants. From statistics, results show that 65% of the graduates are middle-aged women, professionals.

Since September of 1999 is also possible to have a more advanced preparation, that issues the "AB-card". This course consists of four exams: one that is the same for all participants, while the other three are chosen among seven possible choices. The subjects offered regard the different technology fields: specialization in "word processing", using advanced functions of electronic pages, database administration, using and publishing images, creation of web sites, producing digital and telecommunications contents. The pre-requisite for the "AB-card" course is the "A-card". For exams, the questions are more complex, and the participants have 90 minutes to complete the exam. Since January of 2002, the "@-card" is also available, designed especially for beginners. The

card is the first step towards the "A-card". To receive the card one must pass four exams, three common exams and one optional, chosen from file and computer management, document management, and Internet. The exams can be validated if the candidate wants to continue to receive the "A-card". Since 2001 a course regarding the basics of cellular communications is also available, developed and supported by large telecommunications firms, Sonera, Nokia and Ericsson. The course can be run through Distance Learning, via Internet and consists of a multiple-choice test and a reference manual.

Currently there are 400 centers in Finland that offer licensing. Schools, associations, information centers can request training, showing that they have adequate infrastructure and experienced and certified professors. Already having several years of experience and an efficient and stable organization, it's understandable how Finland was slow to adhere to the European project ECDL. Even though program contents were similar, adherence would have caused a slow down and several administrative problems.

Only in autumn of 2001 did the Nordic nation choose to participate in the European project, adapting structures, and requesting that the ECDL foundation guarantee an immediate conversion system for Finnish licenses already issued in exchange for new European licenses. The central administration adopted a conversion system that includes payment and completion of a form, a copy of original certificates and an expense of about 30Euros. All the licenses issued before January 1,2002 will be converted into European licenses. After that date, only the ECDL system will be internationally recognized, and no longer the Finnish license.

The Tieke society, that ran the CDL project, did not want to participate in the ECDL program; the management is now entirely in the hands of FIPA. Due to reorganization, it was not possible to have large publicity campaigns and up until May 2002 only 2700 ECDL license have been issued in Finland. There are about 30 test centers available; many CDL test centers do not seem interested in being converted, while others are working towards conversion, very slowly.

The heads of the project believe in the ECDL and are enthusiastic above all of the international collaboration: two conferences are held each year and members keep in touch via email to exchange ideas, discuss problems, and find common solutions. Even if

Finland was the inventor of the European license, it is no longer one of the forerunners of this project, but is working towards improvement.

Currently the nations that seem farthest ahead in running ECDL are Switzerland, Great Britain, and surprisingly, Italy. In the near future Finland is planning mass publicity via newspapers, television, and informative publications sent to all educational centers. In the more distant future, the focus will be more research based, about the development of ECDL for advanced levels (similar to the Finnish "AB-card") and the diffusion of services offered by the information society to elderly people, a population that continues to grow in number, year after year. In particular, computer literacy for elderly people could allow them to pay bills on-line, order products, manage medications automatically and keep in touch with relatives or neighbors through web-cameras in case they need help.

2.5.3 distance learning in small North-Central Finnish schools

Finland is a country with little more than five million inhabitants, spread out non-uniformly over a vast territory of 337,030 square kilometers. With the passing of time, the population has moved from the North and the Central regions, to the South, in search of more favorable climatic and work conditions. The capital, Helsinki, is in the extreme south, and other major cities, Turku, Tampere, Espoo e Vantaa, are in about a 200-kilometer radius. North-Central Schools are declining in population, and consequently, given that funding depends mainly upon student population, have received less money from the state. Without funding, the institutes have not been able to amplify the number of courses offered, as is the case of more populated schools in the South. Many teachers have had to leave their teaching posts and schools have felt the side effects, being forced to combine with other institutions or even close their doors.

The closing of many schools has made it even more difficult for residents to attend class. Students often have to travel more than 50 kilometers every day to get to school, even on really long Finnish winter days, in which temperatures drop below 30 degrees. The penalty paid by these de-localized institutions seems to ignore the elementary and fundamental principal of the quality systems (ISO 9001, ISO 9004) that

recognizes that centrality is a legitimate necessity for those who use services. Why not focus on the role of decentralized schools in order to offer a service in which technology could become a valid solution to economic problems of schools and environmental problems of students.

More and more schools are developing equipment in order to offer distance learning, with which even students that live hundreds of kilometers away can access regular teaching and obtain a degree. The implementation of distance teaching can be realized in different ways: using entirely or only partially information technologies. In the first case, the student receives materials, exercises, and exams comfortably right at home. Turning in the materials works the same way, using Internet connections. In the second case, the teacher mails the didactic materials that must be physically turned in at school on certain days (usually the student must be present only once or twice a week).

2.5.3.1 the Utsjoki project

Utsjoki (in Sámi Ohtsejohke) is a town with about one thousand inhabitants, located in the extreme northern part of Lapland. It is surrounded by Norway on the east, west, and north. The "Utsjoki Sámi Sixth Form College" is six kilometers from the center of the town and 500 meters from the Norwegian border, separated only by a bridge. The small town has a post office, two banks, a pizzeria-pub called Starza, a restaurant-called Tenonhelmi, a souvenir shop, a small indoor pool, a library and a school. The town boasts of having the best Finnish salmon and has a large number of reindeer farms, which give work to all the inhabitants in the town. The winters are very long with very frigid temperatures that often reach forty below zero. For months there is no sunlight. During the short summer however, there is the famous midnight sun.

The climate, inevitably, influences the character, habits, and rhythms of the lives of the inhabitants. With the passing of years, the center is becoming de-populated, many people are looking for better opportunities for life and work and they move to Oulu, or even to Helsinki, that is more than one thousand kilometers away. It's very difficult to offer competitive education in a town so de-populated and inhospitable. However, high

quality education and opportunities equal to those of people in Finland must be offered to the remaining inhabitants.

In this context, the Utsjoki project was developed. Besides guaranteeing basic training for its inhabitants, the environment lends itself to an experimental type of teaching based on new technologies. The idea of the project came from the town of Utsjoki, supported by the government of Lapland and the University of Oulu, a city known for being at the forefront of technology. The project was not only for a certain level of education, but for all levels, putting elementary schools, secondary schools, and adult schools in touch. Above all, the necessary infrastructures were created, giving the town a civic network and connecting the school and the library to the Internet. Then an efficient teaching method through videoconferencing was studied, given that the project would be based upon the principles of distance learning.

The realization of this system, that today no longer seems so innovative, began in the 1990s, when the majority of the world's population still didn't know what the Internet was. The first videoconference was held between the high school in Utsjoki and a school in Noordwijk, Holland, where two Finnish students were on exchange. There was a simple discussion and a small interview, no distance course, but the first step was accomplished. For all the participants, that day marked a significant change, significant to be able to actively participate in life that exists outside of the small community in Lapland. Technology offered a way to overcome difficulties presented by nature; the teachers and the students had very big expectations for the new opportunities available. According to Anniki Lauerma, a teacher at the Utsjoki high school and one of the heads of the project, "*the introduction of information and communications technology in the scholastic environment gave us the sensation that the world had become smaller and accessible to everyone.*"

The common optimism pushed the school to believe entirely in the project, so much so as to receive funding from the Ministry of Education and the government of Lapland in order to continue its participation. Today the videoconferencing system is used daily in the school and has been applied to various subjects taught, with success, but also with many trials and difficulties which should not be overlooked. For example, the school in Utsjoki and the one in Nuorgam, a town about 50 kilometers away, collaborate

in teaching physics; seven students from Nuorgam can participate without having to come to Utsjoki every day. They can follow the class from a small classroom in the village, where there is also a tutor present. The evaluation of the experience shows that the course the students followed from a screen, had better results than their classmates, physically present in class.

In 1997-98 there was a similar experience for German class, connected with Karigasniemi, a town about 100 kilometers away. Four students were in Utsjoki, two were in Karigasniemi, and in this way it was possible to create a class. Technology in this case demonstrates that it is possible to offer more optional courses for students that live in sparsely populated areas. The school in Utsjoki has always wanted to include music in the subjects offered, but without a competent teacher there was never the opportunity. Through distance teaching it was possible: music lessons were transmitted from Kilisjäarvi, in Western Lapland, from the University of Oulu and in later years from the Music Academy "Jean Sibelius". Students have said they are completely satisfied with the course and also the teachers have joined the learning group, creating eventually a school band. Some of the teachers at the University of Lapland have taught art and projects through videoconferencing during the 1998-99 school year. The work completed by the students greatly impressed the teachers, in the quality of the work and the originality of design. One of the latest courses offered was in Sámi language, in collaboration with Kautokeino, Norway. The Sámi language is the original language of the region and it is very important to transmit the language, in order to preserve the culture and traditions of the region, even if today only a small number of students speak it as their native tongue. [Lau99]

2.5.3.2 an isolated case?

Videoconferencing experiments have grown in the past few years and demonstrate that it is possible to create a learning environment of this type. Teachers have been especially active and motivated and have appreciated the possibility to update their education, above all in technological fields, but also in the subjects that they teach, that takes on significantly new meanings in light of new technologies. Students have

learned the contents of the subjects taught by distance learning and have benefited from using computers, becoming fairly expert computer users. The greatest advantage is that of not having to waste hours of travel time and energy to reach a school from their home villages. This teaching method however did not penalize their capacity to work in groups or their individual socialization, demonstrated by different experiments over the years.

These successes do not come alone: they require intensive planning of activities, extensive cooperation among teachers and institutions and a continual exchange of criticisms and impressions about how the system is working. Technical problems cannot be ignored; they happen continually and are often the principal motive for abandoning the activity. Motivation must overcome these difficulties, that with the passing of time become bothersome, but not necessarily an insurmountable obstacle towards the outcome of the project.

Besides the instruments, a fundamental issue is controlling the behavior of the students, there have been experiments about distance teaching without the presence of a tutor: in those cases, some students disturbed others, and the lesson could not continue peacefully. Subsequently, it's absolutely necessary to have someone in charge present to guarantee the normal continuation of activity. In the same way, the dimensions of the work group are also important, the age of the participants and their motivation towards the project: these characteristics must be well balanced in order to create a successful activity.

The limits of the distance teaching system are evident above all in controlling student activity during class: interactivity is too low to allow greater control. This demonstrates the validity of traditional lessons that should not be completely substituted by distance learning. In the all-around formation of the student, it is important to offer the opportunity to take classes, above all elective classes, through distance learning, but to maintain traditional classes in various subjects.

The evaluation presented is applicable to any area and does not conclude that Utsjoki is an isolated case, even if the idea of overcoming natural barriers thanks to technology transmitted a lot of motivation to the teachers, that volunteered to update their own education, and to the students, that put all of their enthusiasm into the activities undertaken.

2.5.4 communications camp

Technology changes more quickly than do daily habits of people. It influences the work activities and recreational activities of every person, like ways to socialize and communicate. It is a fact that not all people posses the abilities required in the information society; governments and institutions are being mobilized to transmit these abilities globally. The efforts put forth so far have not yet produced the desired results, even if some steps forward have been taken; in particular, empirical analysis has shown that the majority of citizens to not posses the communicative abilities that the information society presumes. [Vih00]

Communications Camp, invented by Marja-Liisa Viherä, director of research at Sonera, a leading company in the Finnish telecommunications market, have become a reality for hundreds and hundreds of young people who meet every summer for eight days, learning the abilities required by the society of the third millennium. The project, which began at the end of the 1980s, has continued to grow, obtaining funding from Unesco and the support of the Finnish Ministry of Communications.

2.5.4.1 learning and having fun

Motivation is the main pre-requisite of communication; man's innate desire for self-expression can be considered the basis of communication. It would be desirable to develop a civil society based on values, using new instruments in creative ways, giving space to self-expression desires that exist in each person. Unfortunately it is contested that the advantages offered by new information and communications technologies have been used only for industrial needs, interested in increasing work efficiency of employees and taking advantage of worldwide communications for commercial mass media. [Vih01] Communications camps want to respond to this need, by offering the possibility to use new technologies as instruments for self-expression and to make life easier. Each year, at the beginning of June, participants meet in a central area of Finland for eight days. Anyone can take part in the camp: it's important to have an open mind and to be motivated to learn and to teach. One of the fundamental principals is "peer mentoring" in which teachers and students don't exist, but each learns from the other. Once settled in,

participants are divided into five groups. During their stay, on a daily rotation, each group takes part in one camp activity: cooking and taking care of the restaurant; producing and distributing a local camp newspaper; working on programming the local radio station; creating, filming and editing a video; efficiently running an information point.

In each activity participants are never left alone, but guided by people with more training and at least three years of experience in the field of communications. The camp has a particular currency, the lecu. Supplementary work, but necessary, like keeping the place clean and doing social activities, may be paid. The group that runs the information point also runs a database of all the extra activities completed by each person, so it also functions as a bank at the end of the day.

2.5.4.2 camp activities

The camp produces a daily paper called "spirals of knowledge". This is published and distributed by the camp participants, and they are responsible for all of the contents of the paper. Emphasis is placed on self-expression, more so than precise journalistic skill. Those in charge must find images on the Internet, use digital cameras and remake the photos on the computer or scan existing pictures. Each member of the group is responsible for the layout of at least one article. The topics are the same as those found in any newspaper: editorial comments, daily news, weather reports, horoscope, etc.. The group is responsible for publishing the final product by a certain time during the night in order to begin distribution, which is done tent by tent.

The camp radio transmits for a radius of eight kilometers and can also be heard on-line. Even cell phones can be used as transmitters, connecting them to the radio station. Programming follows that of a local radio station, with time given to news, song requests, discussion and games, even if a lot of freedom is left to individual creativity. Each tent and work group in the camp is equipped with a radio receiver and transmitter so that the programs are more interactive.

In regards to audiovisual productions, the group is divided in half: one part produces a video like a news show, while the other group produces a short film. All the

camp participants meet, at the end of the day, for public viewing of the works. Each member participated in video production according to his or her talents: some prefer to act, others prefer to direct, and others to edit the work at the end of filming. More importantly, the deadline must be respected and the group must work together calmly and efficiently.

The group that runs the information point also runs the bank, communications with the "outside" world and any technical or administrative problems that might occur during the week. The people that run the restaurant decide together the daily menu, order the right ingredients from the nearest supermarket and in the end, they cook all the dishes leaving enough space for individual culinary creativity. As a means of self-expression the restaurant activity, even if it uses more traditional methods, is as important as the newspaper production, the creation of the videos or the radio programming.

2.5.4.3 a new curricular activity?

The idea of a communications camp, in and of itself is very simple, it can be constructed as one of the many sought after innovative scholastic programs. Knowledge and practice of language and computers are necessary in the information society. Giving incentives to who participates in activities connected to these fields could turn out to be a decisive push towards a global society in which each citizen has the necessary requirements so as not to be excluded. If the student were to receive scholastic credit at completion of the camp, besides giving space to individual creativity and increasing their knowledge of some sectors of communications and computers, the activities could have tangible value. The same reasoning should be applied to study vacations abroad and to cultural exchanges, if connect to scholastic activity through a teacher or a project. In this sense, public opinion must be swayed and old convictions must be erased, by now anachronistic, especially those of some teachers that tend to label modern teaching as "bad" and traditional methods as "good".

Even by proceeding with this renewal of thought, success is not guaranteed. In fact, the most difficult problem to overcome seems to be constituted by governments that, slaves to the interests of multinationals, add to all this political methods. As research has

demonstrated, new technologies are taken advantage of for commercial reasons and not for individual creativity, in this sense, initiatives like communications camp will have a hard time finding support. [Vih00]

2.6 The Future of Finnish Schools

The current situation of Finnish schools seems rather positive considering the general European situation. In an attempt to project the future of schools, one must consider some of the policies adopted by the government regarding new technologies. One could say that the first strategy (1995-1999) created a foundation for the information society, developing infrastructure, the second (2000-2004) is trying to make the envisioned society more concrete. The best way to plan a third strategy is to consider current problems, obstacles not yet over come and to face problems that have not been considered by previous strategies. One of the unresolved problems is that brought forward by Ritva-Sini Merilampi, a researcher for the Finnish Ministry of Education, according to whom *"people are still too concentrated on technology and little attention is paid to content, that in the end is what counts; it's important to develop technical abilities, but even more so to mature a digital culture, necessary to develop an information society."*

Already in the second phase of the national plan to develop information and communications technologies, emphasis was placed on the development of digital contents, but things seem to be progressing more slowly than imagined.

The multimedia libraries, as demonstrated also by school visits, remain an ambitious project but one that is not yet realized in the majority of cases. The conversion of traditional forms of knowledge into digital forms, available to all, requires time, even if progress has been made. The main problem to resolve remains that of the contents of scholastic courses in and of themselves, in that a technological point of view is much too present compared to a pedagogical point of view.

Solving these problems will take time, it is a process that cannot be completed in a few years, but once resolved, attention can be paid to ICT in teaching that was not considered in previous strategies. One can see in particular how the first two strategies

are linked to the Finnish situation and do not consider possibilities offered by the European Union. More attention must be paid especially on the tightening of international collaborative relationships and more cooperation between schools using information and communications technologies. As noted Ritva-Sini Merilampi, *"it's beautiful to be open to the world, knowing that one is able to contribute, only after having resolved all internal problems."* This means that the Finnish are keeping an eye on the international situation and probably the next national strategies will propose methods to connect even more so, thanks to technology, the Nordic nation to the rest of Europe and the world.

CHAPTER 3

3.1 The Italian Educational and Training System

The new Italian educational system is in the process of being redefined. According to law number 1306, approved in November of 2002, modified by the 7th Commission of the Senate, "*educational rights and training for all, for at least twelve years or, in any case, until a qualification is reached by the age of eighteen"* were assured. In a few words, the concept of compulsory scholastic attendance was erased, in contrast to the past, and *the right to education and training for at least twelve years* was introduced. The government advised that this would align Italy with European legislation, while according to the opposition; this would favor professional formation but would put at risk high school enrollment.

The new laws outline the presence of four educational cycles for a young person: "*the educational system is articulated in primary schools, a first cycle that includes elementary and middle schools, and in a second cycle that includes a system of high schools and technical and professional training schools".* The first educational cycle is constructed by elementary schools, which last five years, and middle schools, that last three years. *"Retaining that the necessities of each of these cycles is specific, primary school is defined by a first year, planned for acquiring basic skills, and in two biannual didactic periods; the first level of secondary school is defined by one biannual period and a third year that completes primarily the disciplinary period and assures the direction of and agreement with the second cycle".*

"Babies that reach three years of age by April 30th of the scholastic year in reference can be admitted to pre-schools according to ordered lists and in experimental form, also in relation to new professions and methods of organization". These schools will focus mainly on socialization with others and on education through play. At the end of pre-school, the child then enters into the first cycle of education: "*it's understood that children that reach the age of six by the 31st of August will be enrolled in elementary school; children that turn six by the 30th of April of the school year in question can also be enrolled; elementary school promotes, with respect to individual differences, the*

development of personality, and has the goal of aiding in the acquisition of and development of knowledge and basic abilities of critical-logic systems, and to teach expressive methods including literacy in at least one language of the European Union besides the Italian language, to create a basis for the usage of scientific methods by studying nature, its wonders and laws, and the value of relational capabilities, the orientation of space and time, and to educate about fundamental civic principals. The first level of secondary schooling through disciplines of study has the goal of the growth of individual capacities of study and the reinforcement of aptitude and social interaction; organization and growth through literacy and greater understanding of informational technologies, the knowledge and abilities, also in relation to cultural tradition and social, cultural, and scientific evolution of contemporary reality. It is characterized by diversification of teaching and methodology in relation to the development of the student's personality; care of the systematic dimension of the subject; progressive development of the competencies and capacities that correspond to the aptitude and vocation of the students; offering appropriate instruments for the execution of instructional activities and education; introducing the study of a second language of the European Union; help in choosing the next area of training and education. The first cycle of education ends with a State exam, once completed, a title is awarded that gives the student access to higher education systems and professional and educational training systems."

The project for computerization regards schools belonging to the first cycle, which will receive the most funds in order to modernize. Regarding the method of teaching about new technologies, the debate continues. At the age of twelve and a half, or thirteen, one can enroll in the second cycle of study, which lasts five years. *"The second cycle, aimed at educational, cultural and profession growth of young people through learning, practicing, and reacting, and the critical reflection of the same, is aimed at developing individual capabilities of judgment and the exercise of personal and social responsibility. In this atmosphere, the development of learning relative to the use of new technologies is also treated. The second cycle is constituted of a system of high schools and a system for professional training and education. After reaching fifteen years of age, degrees and qualification can be obtained alternatively school-work or*

through apprenticeship. The system of high schools includes artistic, classic, economic, linguistic, music and choral, scientific, technological, and human sciences schools. The artistic, economic and scientific high schools are geared to correspond to different educational needs. The high schools last five years and the didactic activity is developed in two two-year periods and in a fifth year that primarily completes the course of study and allows for further concentration on the characteristic knowledge and skills of the educational, cultural, and professional profiles within that area of study. High school ends with a State exam, passing the exam represents the necessary degree to access a university or higher artistic, musical and choral education. The admission to the fifth year provides access to higher education and technical training. The possibility to change course of study within the system of high schools is assured and aided, as well as the possibility to go from a high school to a training school or professional school, and vice versa, through the teaching initiatives put in place with the goal of acquiring the right preparation for the new course of study chosen. The attendance of any segment of the second cycle gives the student certified credits that can be accepted, even to return to a program of study that was once terminated, in the interchange of the different schools. (...). In the second cycle, practical exercises, training experiences, and internships in Italy or abroad with periods of exposure to cultural, social, productive, professional, and service realities, are recognized with specific certificates given from scholastic and training institutes, from high schools and training institutes in the educational system and from professional training, with respect to universities and institutions of higher arts, musical and choral education and with the education and training system of higher technical skills, established with reference to the last year of study, specified ways to gain greater knowledge and skills required for entrance to university courses, higher education, and in education and training programs for superior technical skills. The personalized study plans, within the autonomy of the scholastic institutions contain a fundamental nucleus, the same throughout the nation that mirrors the national culture, traditions, and identity, and that allows for a certain number of differences, reserved by the regions, relative to the specific interests of each region, connected to local realities.[Miur02b]

By age eighteen and a half or nineteen, if all the cycles have been completed without delay, the last educational cycle can begin, superior education. The recent university reform modifies the previous structure, based on degree courses that lasted four or five years. Now students can choose between a first level degree, which requires three years of study, and a second, a so-called specialist's degree, which requires five years of study. Once the delegating Law was approved, the effective application of the various regulations will be ordered by a series of legislative decrees that the Government must adopt within 24 months: among these, is a decree that will formalize the necessary coursework and the applied methods for the goal of "development of multimedia technologies and literacy in information technologies."

Not yet defined are:

a) *The essential nucleus of scholastic study projects for the national quotas relative to the specific learning goals, to subject matter and the activities constituted by the national quota of study projects, timing, and limits of flexibility within the organization of the subject matter;*

b) *The methods of evaluation for scholastic credit;*

c) *The minimum educational standards, required for the national assignment of professional titles given after the completion of a course of study, and also for the passage from the course of study to the scholastic course.*

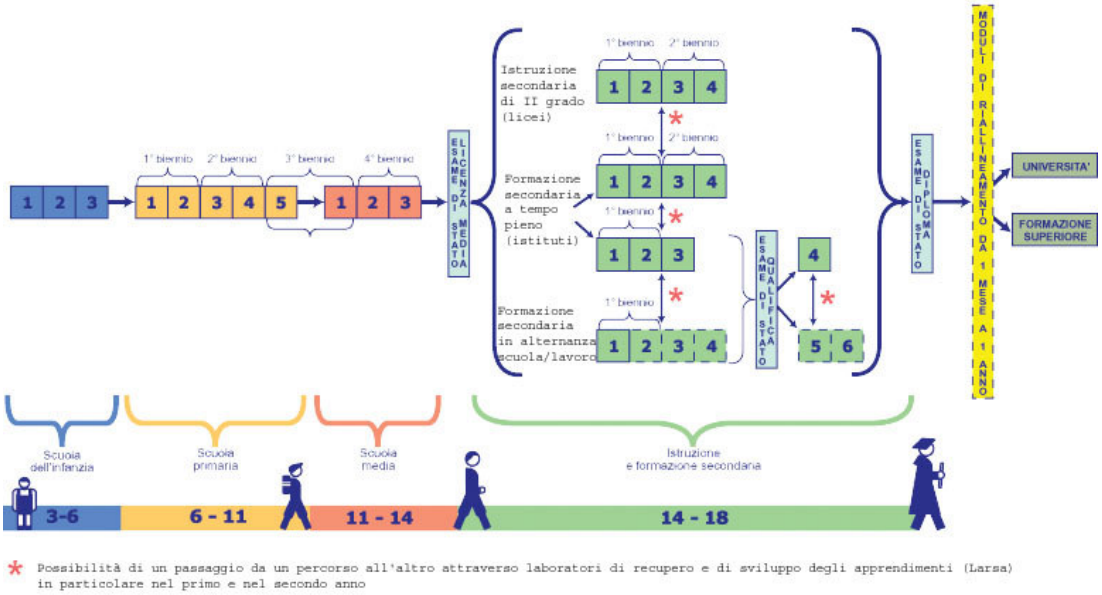


Fig.3.1: the Italian educational and training system

3.1.1 the path towards a new educational and training system

Towards the end of the 1980s, upper secondary schools, after years of immobility, have brought forth several new practices. In fact, in February of 1988, the work of the Brocca Commission began, seeking to redefine study programs during the second and third year of superior schools that once published in 1991 and 1992 were adopted experimentally by many Italian schools. From a structural point of view it is not substantially different from the Gentile reform of 1923, even if the Constitution in 1948 introduced fundamental principals of democracy, those sanctified by articles 3, 33,and 34: *The school must contribute to removing the economical and social obstacles that limit the liberty and equality of citizens, and impede the full development of a person (art. 3).* The school is called to exercise a concrete role in citizens' rights-obligations to participate in public life and to carry out, according to ones abilities and choices, an activity or function that aids the material and spiritual progress of society. *Art and science are free and so is teaching (art.33). The capable and those that merit, even if without the necessary resources, have the right to reach the highest level of study (art. 34).* Based on these articles, after years of lively debate, in 1962, a single middle school was introduced, and the next year programs were established. Fourteen years of age was decided to be the minimum age for compulsory attendance. For high school, though, nothing changed until 1969 when new experimental norms were introduced for the Sate Exam, which remained unchanged until 1998, and a huge experiment began which extended the duration of professional institutes to five years and the access to university was liberalized, before it was only available to students with a high school degree.

The debate of the redefinition of curriculum, in a context that takes into account the culture and European experiences, began in the 1990s and brought about various innovations:

1. the CM n° 257 of 1994 regulated the fight against scholastic dispersion;
2. Directive n° 58 of 1996 gave new regulations for teaching civic education and the DM n° 487 of the same year modified history programs;
3. In 1996 the Regulation regarding degrees for teachers was predisposed and the following year courses at state schools were ended (that lasted three years) and in

state institutions (that lasted five years); a Decree in 1998 then defined the subject criteria to organize first level degree programs for departments of education and for the specialization of aspiring teachers in secondary schools;

4. Law 425 of 1997 regarding the State exam defined new rules that would be applied with the Regulations that were issued the following year;
5. In 1998 a second Community language was introduced among subjects taught in middle schools;
6. In 1999 regulations were issued regarding raising the level of scholastic attendance requirements, the definition of educational credits and debits, the diffusion of multimedia technologies in schools, the institution of an integrated educational system, the creation of institutions that include both elementary and middle schools.
7. The last two years of the second millennium included experiments of autonomy, beginning September 1,2000.

Since September 1,2000 eleven thousand Italian scholastic institutions have entered, after two years of experiments, into the phase of full autonomy. This includes every aspect of scholastic life, placing at the center the development of the personality of the students. Tullio De Mauro wrote this in the introduction to the Notes on Autonomy 2000/2001: "*The schools will take into account the needs of the families, the requests of local entities in letting young people progress in reaching the educational goals set by the Ministry of Education and by the Parliament. The centrality of the students' course of study, flexibility in curriculum in order to improve said courses, transparency in confirming the levels the students reach in working towards goals and national standards, these are the appealing characteristics of the profound innovations that Italian schools are looking to fulfill".* Autonomy does not mean, in such a case, the destruction of the school system into a myriad of autonomous institutions, but the creation of a quality system based on participation, planning, professionalism, organizational flexibility and teaching and a continuous process of observation, self-analysis, and institutional improvement. The realization of autonomy produced changes in some articles of the Italian constitution after the confirmed referendum of October 2001. In particular, the autonomy of scholastic institutions was inserted in the new Constitution (art.117), assuming a constitutional value. Educational and professional

training became solely the responsibility of the Regions. The reform, in line with the new state responsibilities that suggest educational guidelines, defines the essential levels that each study degree must posses in order to be recognized and therefore sensibility throughout the national territory and in Europe. Not everything is clear: in fact, the current phase requires tight coordination among subjects that are involved, particularly among the Unified State Conferences, Regions, and Local Autonomies. The autonomy system give a concrete answer to the national question of instructional rights-obligations and education for at least twelve years, or until a level of qualification in reached, avoiding the possibility of young people entering society and the productive system without an education that is completed after the second cycle and by the age of eighteen. Furthermore, the flexibility of the educational offers, that chance to "taste-test" different courses, protects students from facing irreversible choices. Schools can, in fact, organize teaching activities that make more possible the right to change one's course of study and direction.

The State, with an understanding of the Regions, has established minimum quality standards that all the training courses had to reach, independently from the institution that organizes them, in order to guarantee young people the validity of the title obtained over the entire national territory and in Europe. With the opportunities offered by the autonomy and road to modernization of the school system, not only the structure but also the contents (the study of a European language and computer literacy taught since the second grade), Italy is in line will all of Europe. In fact, the projected system seeks to guarantee to all access to the highest levels of education according to ability, aptitude, and aspiration. The reform is structured in such a way as to eventually be modified according to the results of the first applications. The process then must be applied gradually and constantly monitored. [Miur02b]

	Goals of the education and training system
General	Life-long learning Opportunities to reach high levels of education Spiritual and moral development Development of a historic conscience and belonging to the local, national and European community Educational and training rights-obligations for at least 12 years
Upper Secondary Schools	Educational, cultural and professional growth, through knowledge, participation, reaction and critical reflection Autonomous development of judgment capabilities and the exercise of personal and social responsibility Development of the awareness of informational technologies

Tab.3.1: goals of the educational and training system

3.2 New technologies in Italian Schools

The reform of the Italian education system accents the need to understand technological instruments within the first scholastic cycle. The introduction of new technologies in school is not entirely new, in fact, at the beginning of the 1980s, a few years later than some countries that are technologically more advanced, computers began to appear even in Italy, above all in some North and Central areas and in certain types of schools. The cost of the hardware worked as a preliminary factor of discrimination. In 1985 there were about 6000 computers in Italian schools, of which 5000 were in secondary schools. Particularly those with a technical or professional direction, decisively wealthier, began to equip computer labs, where as schools with obligatory attendance and particularly elementary school the purchase of even one or two computers remained problematic. Massive diffusion was also hindered by technical requirements that seem difficult in the beginning, the lack of software truly convincing at the level of

teaching, and the negativity inherited from the "audiovisual benefits", widely diffused in schools but scarcely (and poorly) utilized.[Cal99]

In the early 1980s the approach most commonly followed was tutorial, of programming, games, and in various forms. In this period a great amount of importance was placed on knowing how to program, given its cognitive implications (abstract capacities, logical deduction, and ordering hierarchical structures). Pascal, which allows for structured programming, was the favored language but Basic was also widely used. In the field of games, besides simulations that were used mainly in scientific disciplines, videogames peaked a certain amount of interest, analyzed from cultural, motivational and cognitive view point, as well as language games. A part from direct relation with the computer, various projects tried to change technological notions into subject matter; one of the first was the so-called "poor computer". The IRIS project (Iniziative and Ricerche per l'Informatica nella Scuola), started at the beginning of the 1980s by CEDE (Centro Europeo dell'Educazione di Frascati) with the goal of introducing into schools basic notions of computer science and linguistic logics, like algorithms, codes, logic operators, archives…, through a series of didactic units based on cards and games within the usual curricular subjects. The project proposed to study, through controlled experiments, the problems and the effects of such an introduction. Through this, first contacts with groups of teachers were made, in schools where calculators did not yet exist, with computerized functions, even if the limit of this approach, the lack of direct contact with a computer, undoubtedly weakened the project exposing it to the risk of becoming abstract verbatim.

By the mid-1980s, the project of introducing computer methods at work in national centers of city laboratories decisively began to expand. For example, projects like Lucas and Amadeus coordinated by Cogi (Centro Orientamento Giovani) in Milan, the Ida Project in Bologna, the computer lab project in the city of Genoa; all of which tended not to identify computers as a subject in and of itself, but rather as an interdisciplinary tool with specific points of reference in various materials. In 1985 the national Plan for Computers was activated by the Ministry for Public Education that cited the intermediaries for the introduction of information technology in the teaching of math and physics in the last two years of school, only recently corrected with the extension to teachers of language and literature for the same scholastic years. Of note, in 1986, a

conference was held in Bologna, at which the Ministry seemed to favor initiatives that introduced computer literacy elements and computer use during the mandatory years of schooling. On a theoretical level, during the second half of the 1980s, attention was placed on behavioral aspects, more mechanical and directed at the control of individual acquisition, a cognitive and constructive approach that focused greater consideration on training activities for student rather than external teaching contexts. On one hand, the student that can decide and structure his/her learning with great liberty is placed at the center of the process; on the other hand, there is a tendency to place great importance on the computer as a means of social-cognitive interaction among equals.

During the three year period of 1986-1988, reflections on the fundamental areas in which to apply computers in education widened. The first book appeared in Italy about the application of computers during Italian class. The discovery of the educational potential of video writing represented a huge acquisition that formed the foundation for those years; the possibility to make some manual processes faster (writing, integrating text and graphics, format, printing) has given a new level of activity to school newspapers, while recovering a wide range of experiences based on the use of traditional techniques inspired by educators like Freinet and don Milani. Even if in a minor way, a certain amount of attention is placed on other groups of software, "general purpose"; general applications like databases and word processing, instruments that allow lists and tables to be constructed, logic selections to be calculated, numeric or logic relations to be established, begin to be included in a wider concept of "literacy" or, as is now preferred, "computer education". With some caution, the change in place during the end of the 1980s can be defined as a move from "computer-tutor" to "computer-tool". In "computer-tutor" applications, the computer substitutes the teacher and has control over the learning process; it proposes questions and evaluates the adequacy or inadequacy of the response. In "computer-tool" applications the computer gives up control over the answers. With this new philosophy, the computer is an instrument for expression and personal organization of knowledge, it works as a cognitive amplifier, as a mechanism capable of quickly capturing internal processes in the initial phase of creativity with respect to other means, making it easier to manipulate in the next search for new solutions. The beginning of the 1990s is characterized by changes in interface and for the onset of new

points of reference constituted by hypertextuality and multimedia. Only since 1992-93 did the first hypertext applications produced by teachers and students widely appear, while electronic multimedia editing began to decrease[...]. In 1996, the first projects relative to an organic development plan for didactic technology in the school system were presented at a governmental level, projects that sought to expressly introduce technology into every type of school.[Cal99]

The most interesting attempt is the Multilab project that applies to all types of schools, including pre-schools, and is the first project to concretely assign multimedia activities in the curriculum of teaching activities. There are 141 participating schools that belong to 20 different cities, one in each region; in each city a pre-school is involved, two elementary schools, two middle schools, and two high schools. One innovative element is the fact that teacher training takes priority, before assigning the funds to buy equipment. A "cascade" system was applied: training a teacher/tutor for each school, funding "lead schools" for the training of other teachers, training teachers giving participating schools a minimum amount of space available exclusively to teachers. Each school must study the project most adapted to its needs, and then begin to introduce multimedia in the curriculum of teaching activities. The schools constitute a big laboratory spread out in all of Italy and they are all connected with a launch pad study by Telecom. [Pod02]

3.2.1 difficulties and diffidence of teachers towards new technologies

Even if projects like Multilab, that foresee the use of new technologies in school, are ever more present with time, the real integration of these instruments in teaching faces notable difficulty, the least of which are psychological, technical, and organizational obstacles. Besides the numerous technical questions the psychological questions should not be underestimated. A huge effort must be made to support the training of teachers, besides obtaining the necessary skills; they must review their role within the school. Many are interested in using telematic instruments in teaching, above all Internet, but at the same time face great resistance in working together with the students and

collaborating with other teachers. According to Prof. Savelli, of the scientific high school "Castelnuovo" in Florence, it's easier to create a good working atmosphere among teachers and students, than it is to involve various teachers in a multidisciplinary project, a project in which collaboration is fundamental. What teachers are missing is a certain mental elasticity that allows them to interpret the system, which is also rigid, according to their own interests. An easy example of how to increase the collaboration among teachers, students and technicians is found in the realization of school web pages that are often the work of individual teacher or even consultants; in such a way that these experiences remain completely isolated and disconnected from the day to day life of the school. Students must be given the chance to realize their own projects, defining a goal that allows them to organize themselves and confront realities, going beyond the passive functions of the computer-TV.

So then, even though the number of initiatives grows, with success, a sign of profound change is missing, pervasive change that would come from massive diffusion of new technologies that in the future would affect rhythm, habits, and the organization of schools and change that would be produced in students by the systematic use of new technology. Teachers that have seen the birth of the computer era are well aware that the computer has always been a famed sign of revolutionary danger, capable of undermining ancient habits and principles acquired over time. One fundamental change can be seen in teachers, who must leave behind the vestments of being the only and indisputable source of information in order to become, as suggested by the National Academy of Science, a "*guide that helps students to orientate themselves among all the information available through technology and interactive communications. They can help students to collect and organize information, judge its value and decide how to present it. Furthermore by moving from group to group, student to student, they can help them to concentrate and work to the best of their abilities."*[Nav01]

Now, with the global training program for teachers, hopefully the situation will improve. However, it's interesting to underline the position of many teachers of a certain generation; Prof. Savelli is an example: "*the majority of teachers, after reaching a certain age and experience level, is not interested in being updated, especially after having acquired a good teaching method. True training is in the collaborative spirit*

between learners and teachers who must realize that they have a lot to learn from their students, especially regarding new technologies."

3.3 The Program to Develop Teaching Technologies (1997-2000)

After the mid 1990s, the problem of extending the use of new technologies to all schools arose. In 1996, the Program to Develop Teaching Technologies (PSTD) was promoted, and it began with the pilot project Multilab that involved 141 schools. Beginning in 1997 the Program involved all Italian schools. The goals of the PSTD were multiple: to promote, among students, expertise in multimedia and telematic instruments and skills to necessary to use them in their work; improve the efficiency of the teaching-learning process and didactic organization; to improve the professionalism of the teachers both in the use of technology and the ability to access, through them, instruments and services for their daily work. The development of the program provided for funding given individually to schools. Keeping in mind their varying initial levels of experience, two sub-programs were created, operating units for teachers and multimedia in the classroom, programs 1A and 1B. In 1A, a program for institutions without experience or with a number of teachers without proper training, about 8000Euros in funding was given to schools that made requests. The funds were dedicated to creating an equipped lab with a multimedia structure reserved for teachers and to organize the first multimedia literacy courses for teachers. The second program, provided about 20,000Euros to schools that presented projects which showed how to integrate multimedia in teaching.

Year	Schools involved in project A	Schools involved in project B	Purchasing equipment and running costs	Updating teachers in schools	Initiatives to support and promote	Total costs
1997	5320	1898	72,4	7,8	1,5	81,7
1998	5000	4020	123,9	11	3,3	138,2
1999	2984	1711	62,9	4,6	0,6	68,1
2000	0	4000	93,5	0	0,9	94,4
Total	**13304**	**11628**	**352,7**	**23,4**	**6,3**	**382,4**

Tab.3.2: schools involved in PSTD and relative expenditures (in thousands of Euro)

All information and communication technologies were taken into consideration, thinking mainly about how to integrate them. Telematic networks and multimedia work stations were the primary instruments, but also television was not ignored, equipping 60,000 schools with satellite receivers, thanks to an agreement with the state television (RAI). Computers were put in multimedia laboratories, in classrooms for work groups and for classes with media support, and in the service centers. The Program encouraged connection to a local network for all of the equipment in the school, besides Internet, guaranteed by local services or by free plans offered by major service providers. The plan also allowed for a section that would boost didactic services, like libraries, in which materials could be made available in digital format. Furthermore, the production of free didactic programs made by schools was encouraged, listed, and made available for order on the Ministry website. The program also referred to the creation of a Technological Observatory, given in experiment to the Scholastic Regional Office of Liguria. Completely on-line, the observatory had the role of providing information and technical consultation for the purchase and use of software in public domain and to gather examples of school networks, with reference to technological and organizational aspects. The observatory was also in charge of controlling the situation regarding accessibility, even for the disabled, of school websites, and offering consultation to schools. All of the activities outlined in the program to develop teaching technologies would be put into an annual report, based on informational sheets filled out by schools and teachers. [Mpi00]

3.3.1 results obtained by PSTD

3.3.1.1 technological resources

At the end of the Project to Develop Didactic Technologies (PSTD), during the school year 2000-2001, the Ministry of Education, University and Research conducted an investigative and monitoring activity, with the goal of understanding the development of innovative technologies in schools. The collected data came through a questionnaire given to all the Institutions, transmitted via computer. One of the parameters for the various analysis is the number of elaborators; the results show that the average student-computer ratio is 28-1; the most equipped region is Friuli (20-a) and the least is Campania (44-1). Among the categories of institutions, the technical ones (12-1) and

professional ones (14-1) are the best technologically equipped, while high schools and state Institutions prove to be rather lacking (32-1). Another important statistic surfaced based on the wiring of the institution: the national average shows that about 38% of schools are connected, with Umbria leading the regional classifications (56%), and Basilicata showing up last (21%). Technical institutes prove to be at the forefront, with 82% already networked, while only 5% of the art institutes are networked. The answers to the questionnaire show that only 20% of the institutes have an Intranet. In these institutes, the use of local networks regards the consultation of the school library, web server use within administrative services, the facilitation of communication for teachers and students, and the realization of school projects.

Larger percentages, however, use Internet connections, present in an average of 94,8% of Italian schools. The Marche region leads the special classification with an optimal 99,1%, while Calabria ends the classification (89,8%). Of all the connected schools, 65% have an email account dedicated to teaching, while only 8% give students accounts and 17% to teachers. The connection is active mainly by an ISDN connection (59%), but an encouraging 18% of schools also have a wide band connection (ADSL) available. 44% of the institutions also has its own web page, hosted by a service provider in 92% of the cases. The facts regarding the responsibility of maintaining the computer structures in the institutions are very interesting: in 89% someone is in charge of this; in the majority of cases (52%) it is only a teacher, even if they are often assisted by Ata personnel (41%). [MIUR01]

3.3.1.2 the training and response of teachers

In February of 2000, at the end of the program, an Investigation was made on the training, competency and response of teachers. A questionnaire was sent to a random sample of 1011 scholastic institutions, on magnetic support, that was made up of various sections: competency of teachers, general competency levels reached by teachers at the end of PSTD, evaluation of the training course, and the experimental progress. This last section was reserved for those who participated in the project “multimedia in the classroom”. 35% of the questionnaires were returned; from the analysis of the first part

of the questionnaire, the average age of teachers involved in the project proved to be primarily between 46 and 55 (47.6%). According to the report, this value is higher in comparison to initiatives promoted by the Ministry about ten years earlier. Furthermore, literature and math are the only subjects involved in the project: respectively 17.2% and 12.2% of the teachers involved teach these subjects. The subject least involved in the PSTD was Physical Education (1.9%).

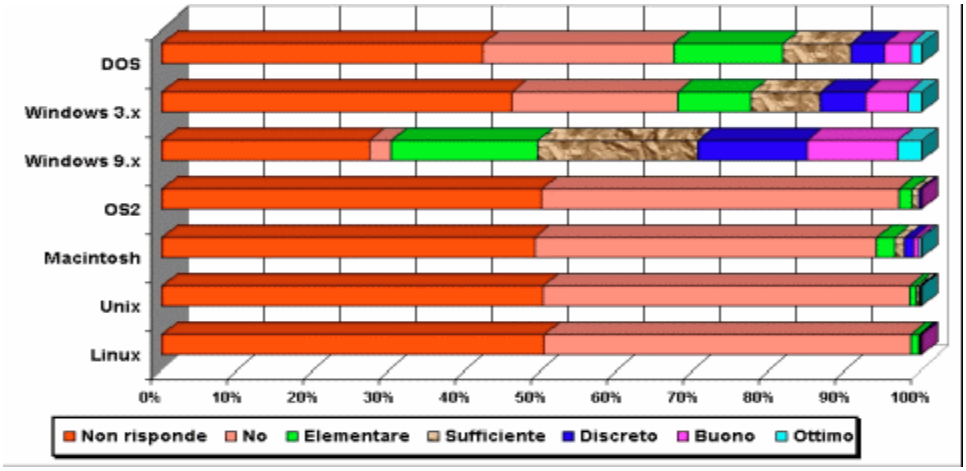


Fig. 3.2 : project 1A: known operating systems (source Servizio Informatica MPI)

Only a small number of teachers has computer capabilities. Regarding the operating systems, the majority use Windows 95 and Windows 3.x, while a small percentage has worked with UNIX (2,5%), Linux (2,6%) or Macintosh (8,4%).

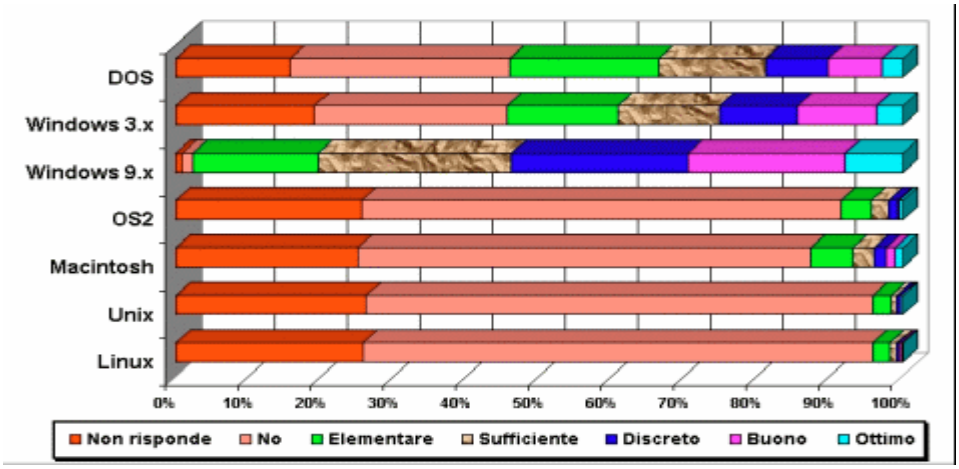


Fig. 3.3 : project 1B: known operating systems (source Servizio Informatica MPI)

Very few have never written a document on the computer (4%); many, on the other hand, have never worked with a database (39,3%). Among the teachers involved in project A, about 51% have a home computer, while this number grows to 74% for those involved in project B.

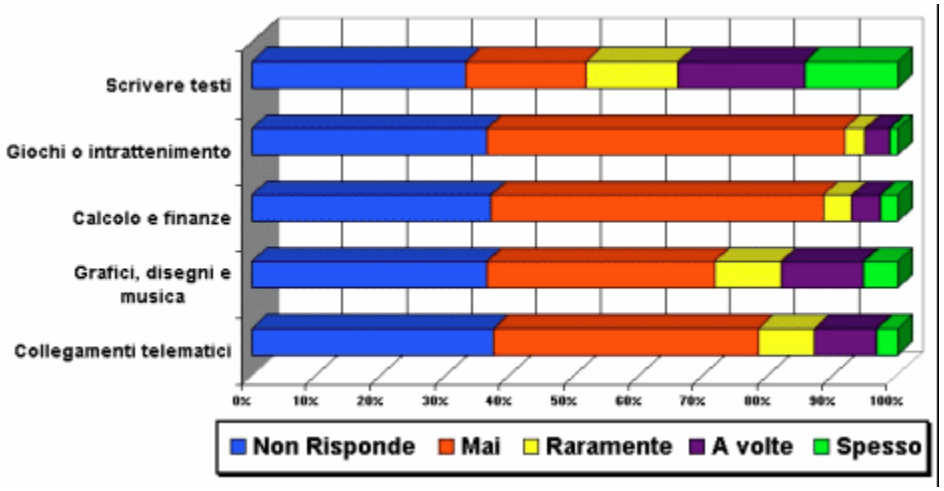


Fig. 3.4 : project 1A: using computers at school (source Servizio Informatica MPI)

It's also interesting to see how and when computers are used in teaching: often for writing documents, fairly often for graphics, almost never for overhead projection. The use of Internet is still rarely used: only 20,4% say they use it regularly. Outside of school, the situation is the opposite: 48,3% of teachers use their home computer primarily to connect to the net.

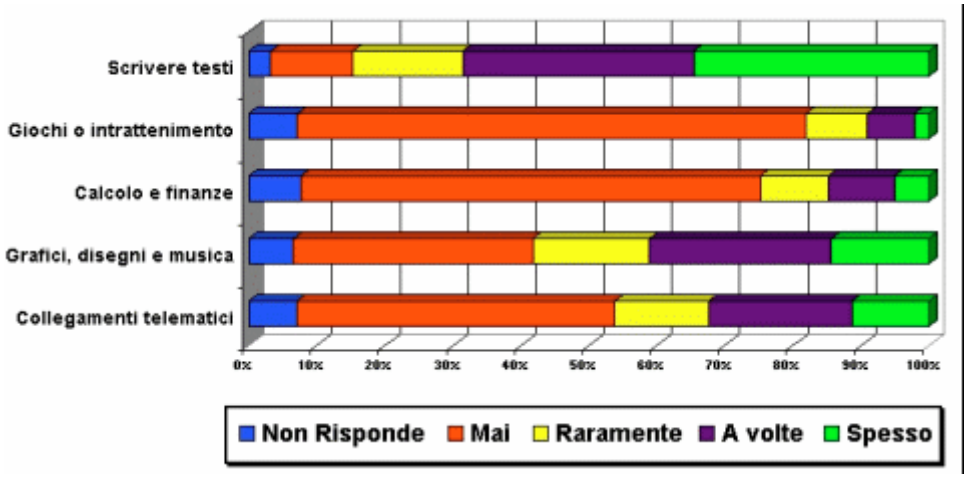


Fig. 3.5 : project 1B:using computers at school (source Servizio Informatica MPI)

The questionnaire also asked teachers to self-evaluate the level of competency reached at the end of the project: only 3,3% considered themselves experts in new technologies; 17,2% thought to have reached a discrete level of capability, while 11% judged their own knowledge unsatisfactory in the subject.

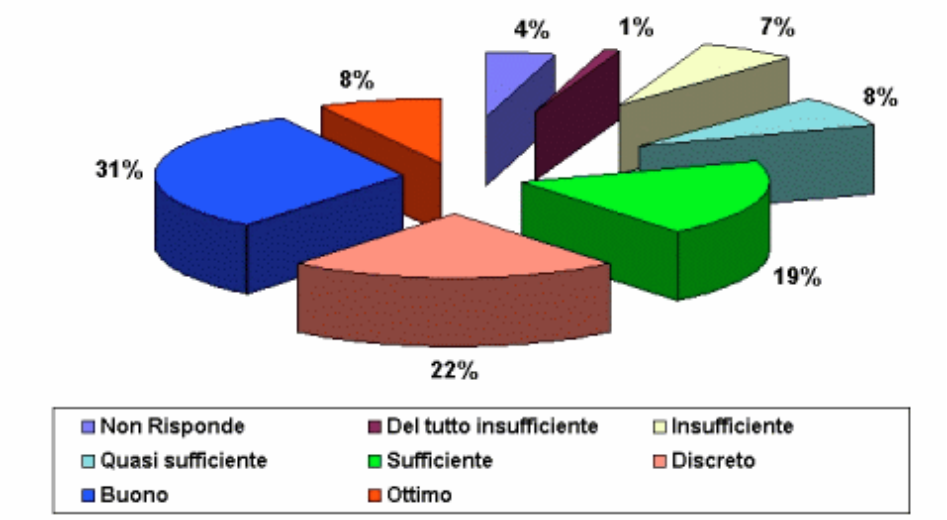


Fig. 3.6 : judging the course (source Servizio Informatica MPI)

In the questionnaire teachers were asked to give an overall judgment of the course they took; the evaluation possibilities were articulated in a qualitative scale typical in school grading. The following tables show the percentage distribution and highlight, for project A, how 15,96% were unsatisfied while 41,1% judged the course good or great. For project B, the same percentages are 9,51% and 48,59%. The biggest difficulty encountered by participants was represented by the technical aspect of the course, considered a medium-high level.

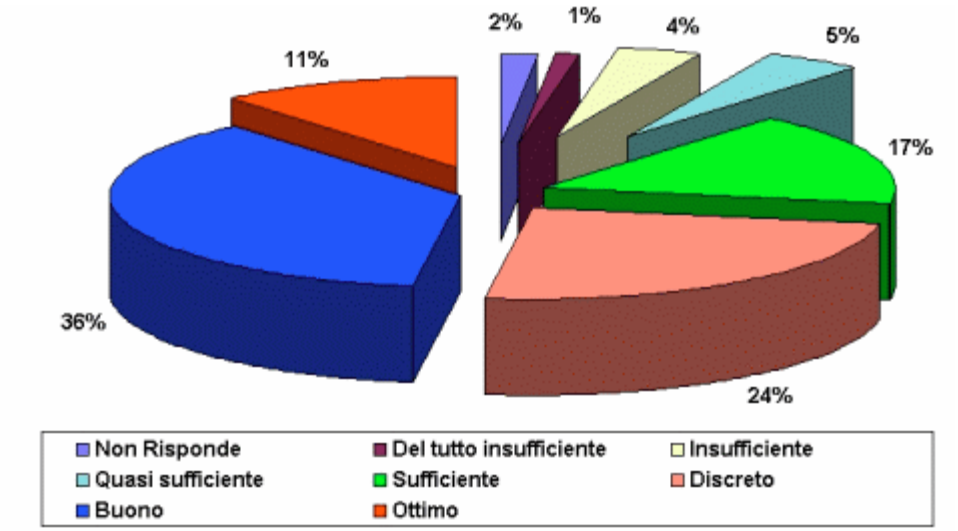


Fig. 3.7 : judgments of course 1B (source Servizio Informatica MPI)

One of the main problems with inserting new technologies in teaching is how these will be used exactly. The questionnaire refers to this topic, and the results show that 24% of teachers see computers integrated within one subject; 28% within more subjects, while 11% consider computers as individual projects in an interdisciplinary context. Many of these, 28%, see ICT as functioning within their subject area; a small percentage, 9%, see that new technologies would be difficult to integrate in the rest of the curriculum.

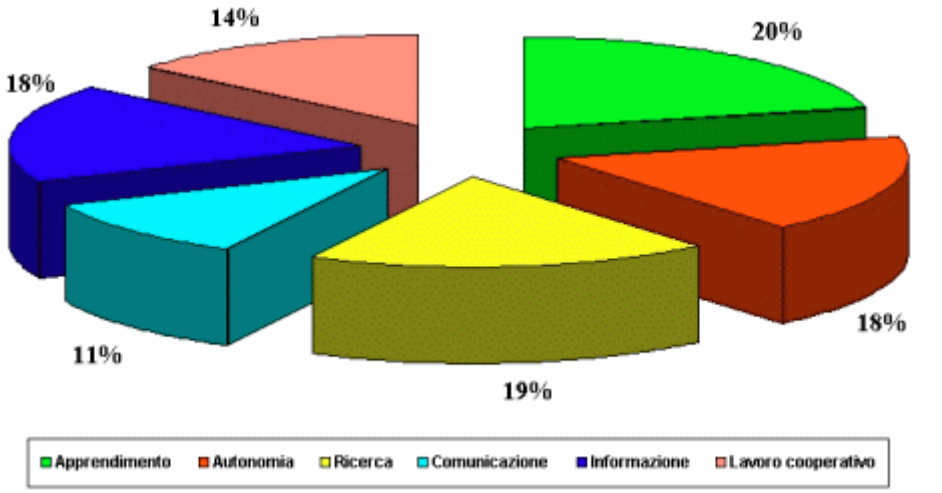


Fig. 3.8 : PSTD: effects on students (source Servizio Informatica MPI)

The last aspect that must be highlighted is the benefits new technologies have given to students: many teachers (20%) declare that new technologies have made learning more efficient, while others (18%) say it has encouraged greater autonomy in

resolving problems; computers stimulate students towards individual research for information (19%) and the desire to communicate (11%), above all in a foreign language. The percentage that judged technology useful for the development of working in collaboration (14%) must also be considered. [Gor00]

3.4 The "National Training Plan for Computer and Technological Skills for School Personnel" (2002)

The plan constitutes the actuation of deliberations of the Ministry Counsel and the decree of March 22, 2001, in the area of the Italian Plan of Action for the Information Society, that at one time constituted a response to indications given in Europe with the plan of action eEurope issued at Lisbon in March of 2000.(see par.1.4.3) According to Letizia Moratti, Minister of Education, University, and Research, "*Italy is greatly behind in the innovation of its education system in comparison to other European countries.[…] The problem is structural, and in order to resolve it, innovation can offer a substantial contribution, as a process that facilitates communication at all levels of education. The world of education and of university must continue to grow closer to the users of those worlds, students, reducing physical barriers and augmenting the diffusion of knowledge through new technologies. At the same time we can augment the skills relating to new technologies, especially in scientific fields, making those instruments more available in scholastic contexts.*"[Esp02]

Italian schools realized only as of late the potential of new technologies. Until a few years ago, the profound changes created by the diffusion of computers, and Internet in learning, and the way younger generations work was not greatly taken into consideration. Students that use computers acquire new learning skills based on a continual practice of interaction with virtual worlds of games, expression, and communication. By ignoring this process, the school could remain even further behind and in the European and global context, the lack of knowledge would constitute a new form of exclusion. It's evident that the goals the must be guaranteed to young generations, at the end of their scholastic course of study, are both the skills necessary to

use instruments made available by information and communications technologies, and the theoretical awareness capable of rendering users aware of their capabilities and limits.

Goals can be reached only if the use of new technologies in Italian schools is not confined to specific subjects, but it becomes a common practice that involves a full range of activities, didactic and non, that are run within the school institution. Reaching such goals appears subordinate to the fact that teachers, in turn, are able to face this role that is less about transmitting specific pieces of knowledge and more about changing the way schools run and knowing how to proficiently use technology in everyday teaching.[MIUR02a]

The starting point regarding computer literacy of teachers is that skill levels vary greatly and can be divided into four categories: those that have no computer skills or next to none; those that are able to use new technologies but not to apply them in significant ways to teaching; those that are experts in using new technologies in teaching; and last, those that are specialists in the field of information and communications technologies. The goal of updating and training teachers is to have them reach a level of computer literacy that is satisfactory and have them learn how to apply computers to teaching. At then end of the training, three levels of preparation will be reached: for level "A", 180,000 teachers will then have basic skills necessary for working with new technologies; for level "B", 15,000 teachers will become "*reference points for the use of technological and multimedia resources in teaching*", while for level "C", 5000 teachers will be "*in charge of the technological infrastructure of schools or network of schools*".

The goal will be reached through courses, self training assisted by a tutor and network instruments and services that support the activities. The plan will be realized in collaboration with all the entities in the scholastic world: Minister, regional entities and schools. The Minister will program the resources and distribute them, as well as define training standards and create networks of services to support the development of all levels of training. The regional entities will run the training for levels "B" and "C", as well as promote and coordinate the work of institutions, responsible for level "A". To utilize competently the instruments and basic functions of information and communications technology, it is assumed that the syllabus of the course refers to that of the European Computer License (ECDL). Teachers can, freely and voluntarily, take the exam for the

individual certification at one of the accredited AICA centers that offers the ECDL in Italy, at one of the upper secondary institutions. Teachers are also encouraged to use these methods in their work area in and outside of class. The training for level "B" is especially important, because teachers with this level of training will be in charge of acting as consultants and support for other colleagues. To reach this level, teachers will participate, in groups of fifteen, in seminars held by experts in the use of information and communications technology in teaching. Furthermore, on their own, they will do exercises more in depth study, this will be done by way of network materials with the help of a tutor.

The responsibilities of teachers at level "C" will be to guarantee the proper functioning of scholastic equipment and to offer advice on practical aspects of their use. Their skill level must be advanced, and they must understand the running of school networks and their daily use, and the configuration of work stations, through the creation of accounts and the installation of applicable teaching software, as well as consulting their colleagues and school directors on the purchase of new equipment. Teachers in this range will gain these skills thanks to seminars held by experts in the field and self-training with the help of a tutor.

Activity	**Thousands of Euro**
Basic general training (level "A")	50
Training for leaders in use of technological and multimedia resources in teaching (level "B")	7,5
Training for those in charge of the technological infrastructures in schools (level "C")	4
Support actions inside of schools for the use of technology and multimedia resources	3,5
Total	65

Tab.3.3: funds designated by the Ministry of Education, University, and Research for updating school personnel.

3.5 Analysis of the Current Situation

3.5.1 first emerging data from research: the difficulties in collaborating with institutions

Italian bureaucracy is known for how it is capable of slowing down, and some times making impossible, research or new policies. This is present in all levels of society and often times the only way to finish a project is to try to avoid, legally or otherwise, the huge bureaucratic machine. Such problems were also encountered in the research conducted among various schools: one episode is worth remembering, a perfect example. To give greater significance to the investigation, it was fundamental to visit a couple of schools in the Italian capital city, Rome. Through an association that works with the scholastic world, CIAS, two appointments were made with several schools in Rome. The first appointment was at 11 a.m.. Knowing that getting to the school would take a lot of time, the fastest route was decided and the researcher left two hours before the scheduled time. Due to a strike, the bus that he took, was re-routed. Not knowing what to do, and after waiting for a long time, he decided to take another means of transportation. That morning, all the means of transportation were slowed down, and he finally got to the school at 11,20 a.m.; being twenty minutes late however, made the visit impossible. The teacher who was scheduled to do the tour was already in class teaching. Meeting with the President of the school with many apologies for the late arrival did no good. He responded, rather irritated, that it was not possible to speak with the teacher during class time and the researcher would have to wait for the last bell to sound to meet with him. Until that point nothing happened, except that, after waiting more than two hours: the students, the professors and those present, bored at that point, all left. The teacher with whom the appointment was made responded that the visit wasn't possible because everyone had gone home. The visit had to wait until the next day, the researcher lost time, money, and patience.

Episodes like this happen everyday and demonstrate how having technology and economical resources don't do any good if directors at high and low levels prove to be rigid and close-minded.

The lack of collaboration and little availability of Italian Institutions and Entities are confirmed also by the low number of questionnaires returned (10%). The justification brought forward by some is the common underlying aversion: there are too many requests that come from various institutional sources for teachers that are in charge of various areas and they think it's best not to respond to requests of individuals that are not institutional, like myself, for research purposes. One email of protest, that accompanied a completed questionnaire, was very enlightening. The email complained about the fact that the research was not limited to the database of institutional sites, without taking into consideration that these do not give useful data for comparing the policies of different countries on a very specific topic. Consequently, given the difficulties involved, and acknowledging that schools take into consideration what comes from the Region, it was decided to contact all of the regional education departments and the IRRE. After a long period of waiting, one reply arrived, from the IRRE in Lombardia, which would have put the researcher in contact with a sample of schools chosen by them. Looking back after several months, it's easy to see how many promises made were not maintained.(see Fig.3.12)

The analysis of the questionnaire was a central part of the research. In order to gain a more complete view, a request for a substantial amount of collaboration from Institutions was made. Given the little amount of collaboration offered, the most rational decision, in the end, seemed to be to not to wait for sample schools from the entities, but to send the questionnaire to a number of schools found through a database on the Internet. The most current data was found on the Indire site from Florence. Even in this case, unfortunately, a high percentage (60%) of the emails sent never returned to the sender, for various reasons. The most frequent reasons were errors due to a change in email address that was not notified to Indire, or the infrequent use of email at the school, that made the mailbox too full to accept any more incoming messages. Among the schools that received the request, some responded, saying that the questionnaire sent could not be read. Since the sent files were complete and without viruses, the receiving computers must have been infected, making the document impossible to read. To get the questionnaire to these schools, it had to be then sent by fax, canceling out the usefulness of Internet and email. Even research institutions like the CNR of Genoa who once offered

to be available to help, after being contacted to set up an appointment, they never answered. (see Fig.3.12) The biggest help was from telematic magazines on education and new technologies, EdScuola and Dschola, sensitive to the request for collaboration. They sent the notice around to all of their subscribers, mostly teachers and other workers in the field, and they inserted the announcement in the forum on their website.

3.5.2 results of the questionnaire

In order to obtain a complete picture of the Italian situation on the usage of new technologies in teaching, a questionnaire was prepared and sent to institutions, made up of four different sections. The first part was dedicated to general information about the school; the second was about the availability of computer equipment in labs; the thirds asked information about computers in classes and the school policies regarding new technologies, while the fourth section investigated school projects in which new technologies played a central part. The questionnaire was sent to about 400 schools, mostly through email, choosing a sample of schools for each region from the database of email addresses of the Indire schools, but also through the precious collaboration of the editors of EdScuola, and of Dr. Maria Piccione from the University of Siena, who was in charge of contacting schools in Tuscany.

Besides via email, the questionnaire was also filled out by those responsible for new technologies in the schools visited personally. At the end of the deadline for returning the questionnaires, forty completed questionnaires were received, from ten different regions, mostly in the Tuscany and Marche regions.

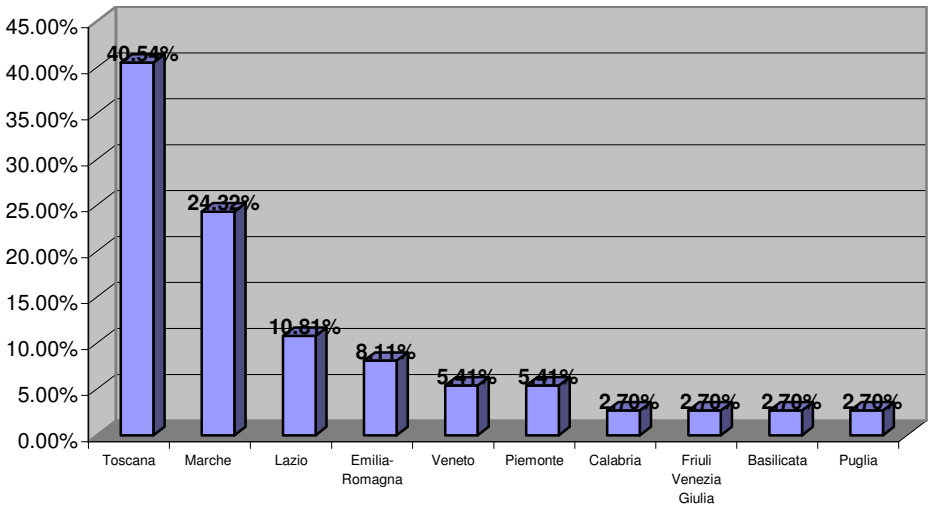


Fig.3.12: regions that participated with the questionnaire

Taking into consideration the Italian areas that the investigation reached, one can see how the Center areas participated more than the North or the South.

North	16,22%
Center	72,97%
South	8,11%

Tab.3.4: Collaboration with the questionnaire divided by area

Regarding the type of schools that responded to the questionnaire, one notes the uniform distribution of percentages among Scientific high schools, Technical Institutes, and Professional Institutes.

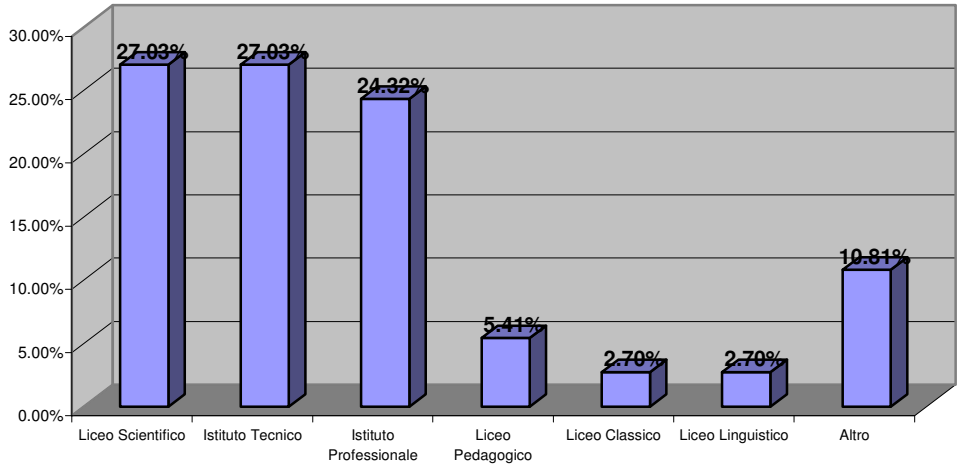


Fig.3.13: types of schools that collaborated with research

On average, each institution is composed of 623,76 students, even if the size of the schools varies greatly, above all in relation to where the institution is located. The explanation is in the fact that in recent years, many schools have been incorporated with others, particularly in scarcely populated areas, in order to maximize administration.

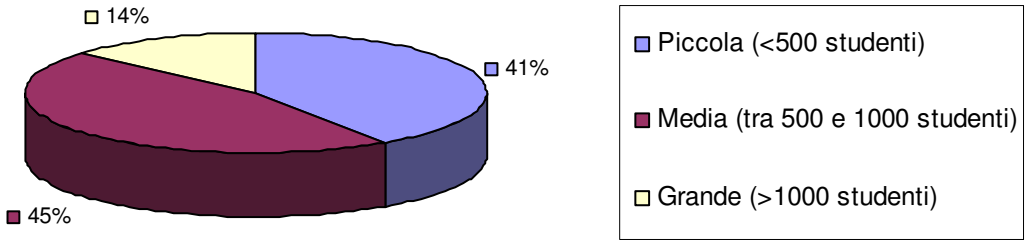


Fig.3.13: size of schools that participated in research

The average number of available teachers is 76,78, that allows for approximately one teacher for every eight students. This value, so high, is not the same for computer teachers or for lab technicians.

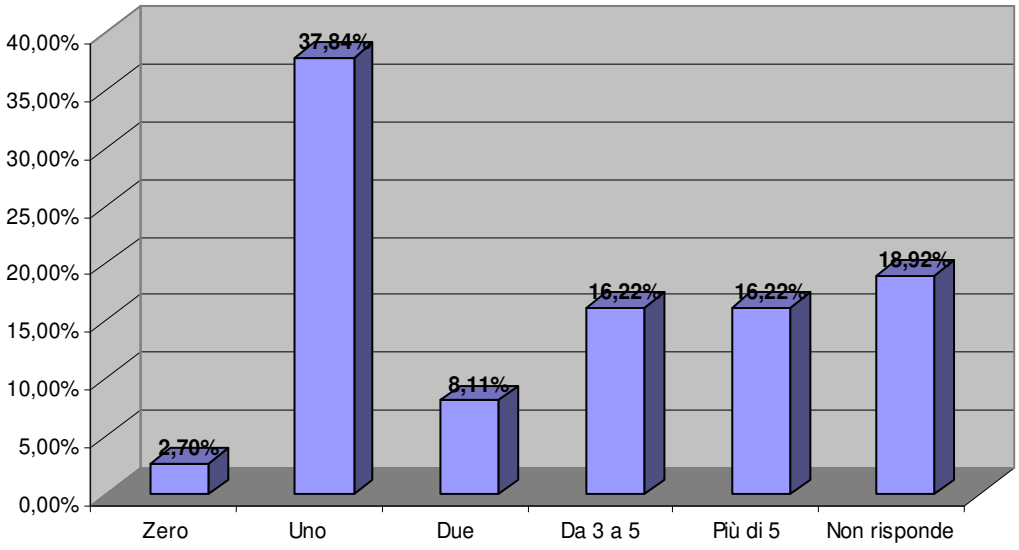


Fig.3.14: number of computer teachers

One of the obstacles to introducing new teaching technologies is found in the age of teachers, considered too old to enact a change in teaching methods and evaluation. The average age of computer teachers or who is in charge of new technologies 43,1 , but one must also consider that 43% of those questioned preferred not to respond to this question, perhaps considered too personal.

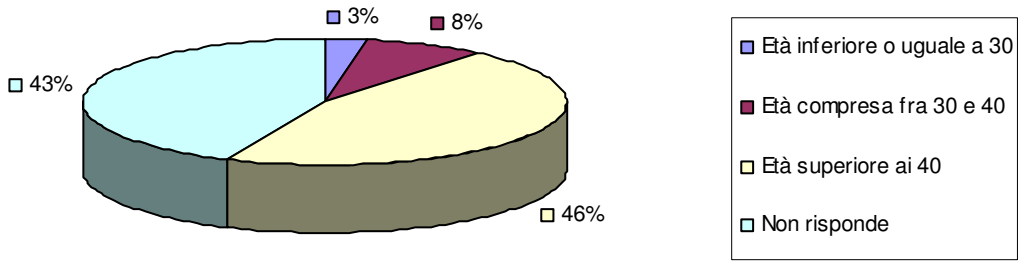


Fig.3.15: age of computer teachers

Another investigation regarding gender divisions shows that 58% of computer teachers are male while 42% are female. The high percentage of women is due to the fact that in many schools teaching about computers in the job of mathematics and physics teachers, often female.

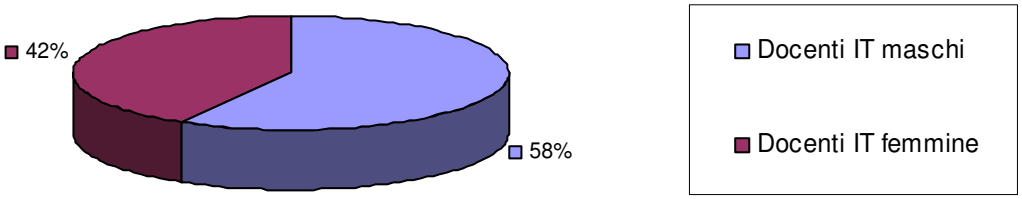


Fig.3.16: computer teachers divided by gender

3.5.2.1 available equipment

During the last few years Italian schools have been considerably modernized, reaching European standards in many areas, thanks to capital investments for the construction of computer infrastructures in schools. One of the most important statistics is the ratio of "students per connected computer". The European Union, through the program eEurope, poses the goal of five students per connected computer. The Italian average derived from the questionnaires answered was an uncomfortable 29,44 with 27% of the schools with a value between 0 and 10 but also a significant percentage (10,8%) of institutions with an average of over one hundred! In particular, scientific high schools were noted to have a closed attitude towards technology: in the majority of schools only one computer lab exists, with few computers with outdated software. In one case, the laboratory had twelve computers with 286 processors, with DOS operating systems, and the only available application was Pascal programming.

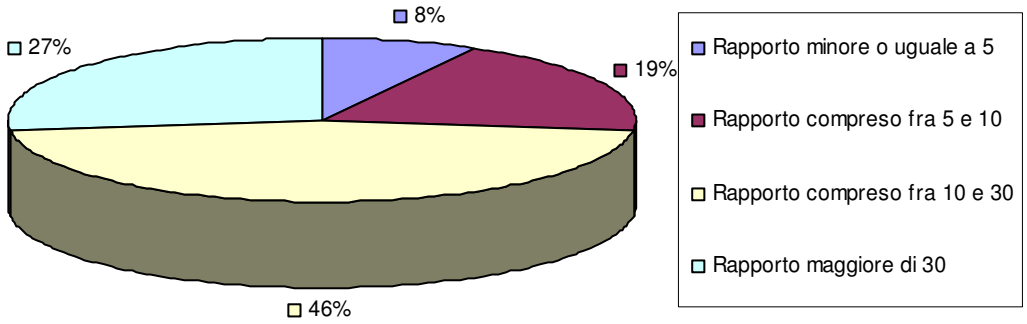


Fig.3.17: student-connected computer ratio

Considering the equipment found in labs, one notices that all schools have a printer, testified by the diffusion of word processing, the most known computer application in schools. The use of scanners and CD burners is growing greatly (97,3%), used mostly for producing school newspapers and multimedia cd-roms. The presence of video projectors is also interesting (32,4%), used widely abroad, but in Italy rarely used

to date, which shows how it is possible to use ICT during a normal class, showing the results of an experiment through a simulation or using slides for an explanation.

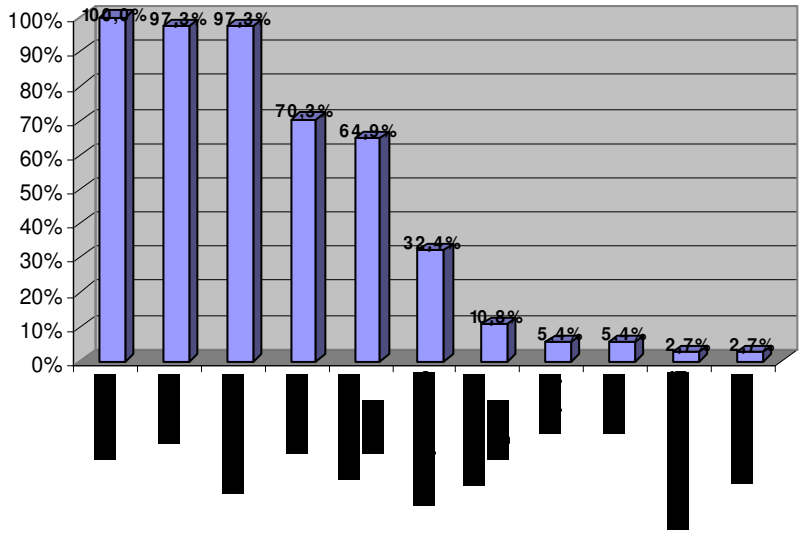


Fig.3.18: computer equipment available in schools

Regarding operating systems installed, Microsoft Windows dominates in comparison to all other systems, even if, surprisingly, Linux is used in 21,6% of the institutions, especially in technical institutes. Only a small percentage use Macintosh (8,1%), mostly for graphics and desktop publishing.

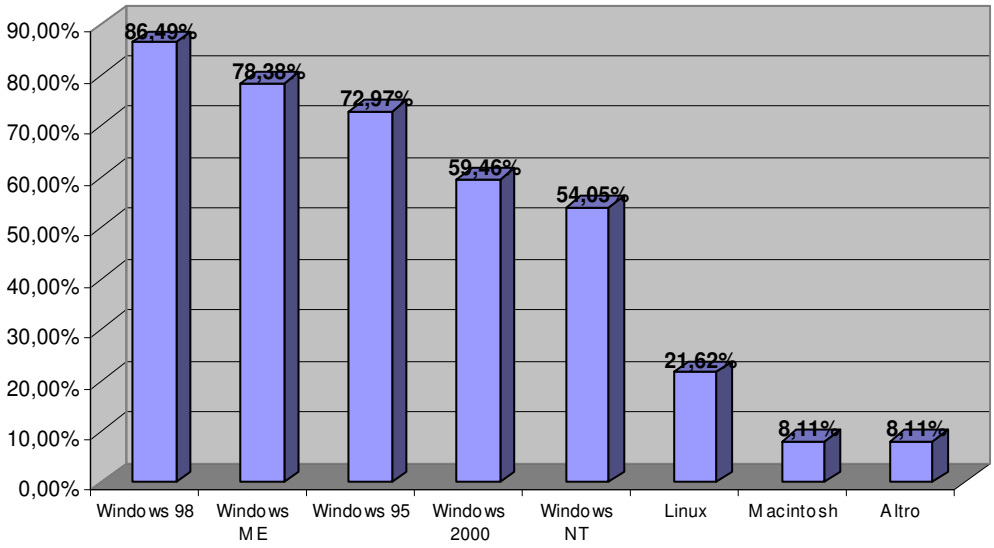


Fig.3.19: installed operating systems

One of the objectives of the eEurope program is to connect Europe by networks. One could say that this goal has been reached in Italy, given that 100% of schools have access to the Internet, which in the majority of cases is "broadband" (54%). No institutes are connected by modem, while some are connected with an ISDN connection (37,8%).

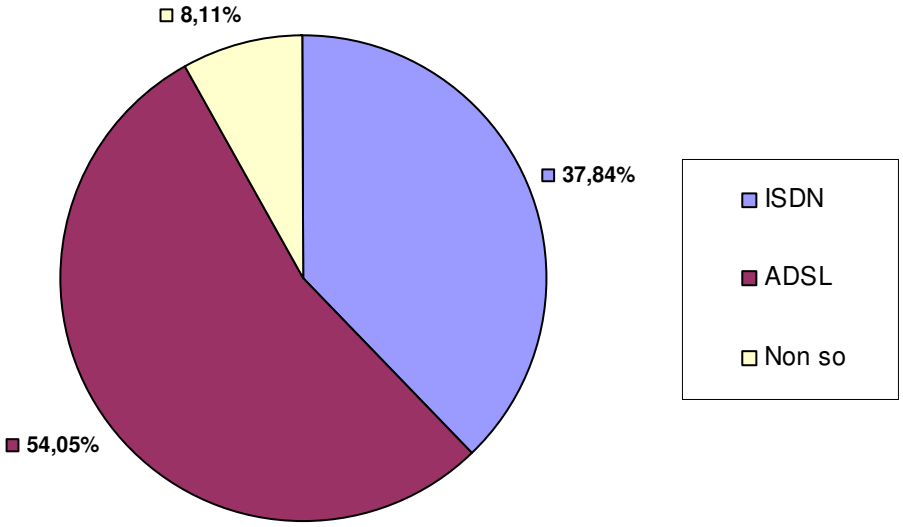


Fig.3.20: type of Internet connection

The wiring of local networks is fairly good in the institutes, given that the overwhelming majority is networked (83,7%). A small percentage of schools are only partially connected (5,4%) , while the rest still need to be updated 10,8%. The worst problem encountered is the lack of computer labs, that although it is a European objective, almost all of the schools interviewed (97,3%) say they do not have one.

3.5.2.2 ICT in classes and school management policies

Even though there have been many changes and experiments in the past few years, it's important to understand if new technologies have had a significant impact on didactic programming and how much they are used in both curricular and extracurricular areas. Other distinctions can be made for the type of institution, given that technical schools have had "computer classes" as a part of the curriculum for several years, while in other schools it has been inserted only as an experiment, like with the National

Computer Plan (PNI) for high schools where it is included in math and physics class time.

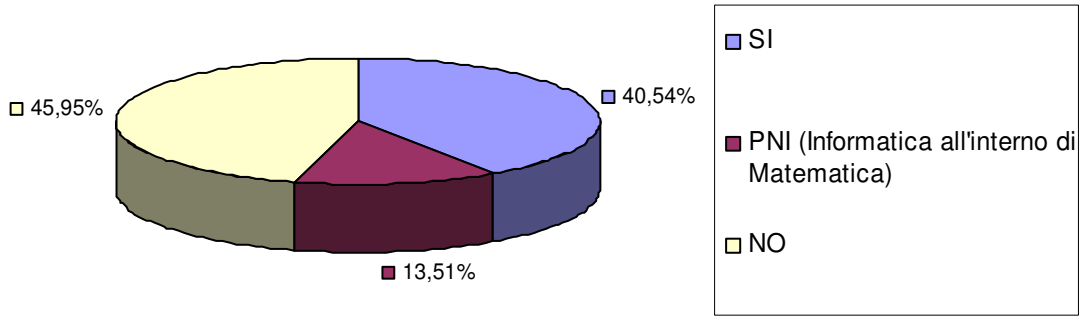


Fig.3.21: presence of computers as a subject

In many schools (45,9%) computers are not a subject taught, but exist among extracurricular courses offered, mainly to satisfy the request to learn the most common programs available (31,8%).

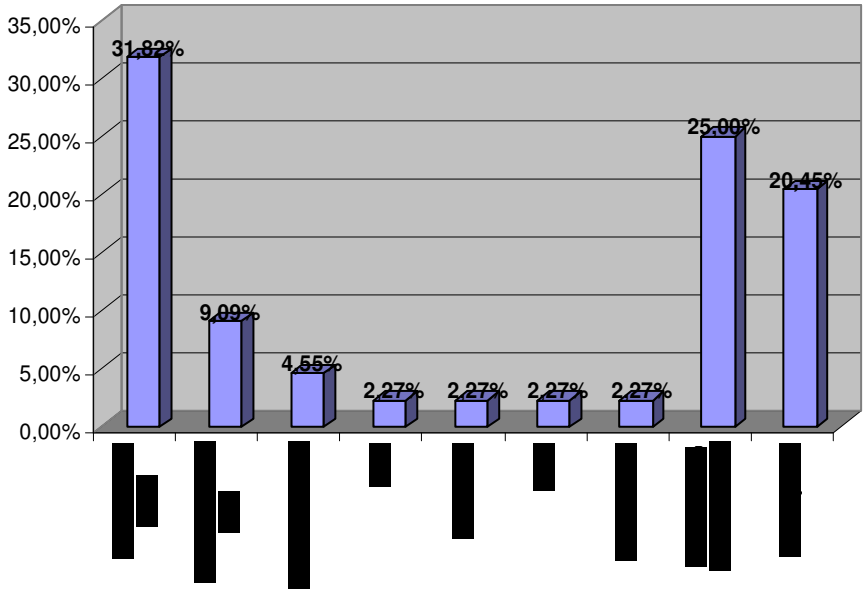


Fig.3.22: extracurricular courses offered

Even if "computers" as a subject does not exist, ICT are used as instruments in all subjects. 37,8% of the schools declare to use them in all subjects, while 62,1% use them mainly in some subjects. Among these is certainly math (69,5%), even if the computer is also a widely used instrument in languages (47,8%) and physics (34,7%). The presence of ICT in humanistic subjects like Italian (26,1%), history (17,4%) and Latin (13%) show how computers can be productively used in any learning atmosphere with a certain amount of initial effort on the part of teachers and students.

As previously mentioned, writing papers on the computer is the typical activity in which computers are used (46,8%), but the growth and diffusion of Internet has also brought about its use within schools as well (34,4%), even if many are skeptical. Programming languages are still taught (31,2%), inherited from the first ministerial programs that planned the introduction of computers in teaching. Other activities are added within these activities, more specific activities like programming Excel (12,5%), CAD (9,4%) and simulations (6,2%).

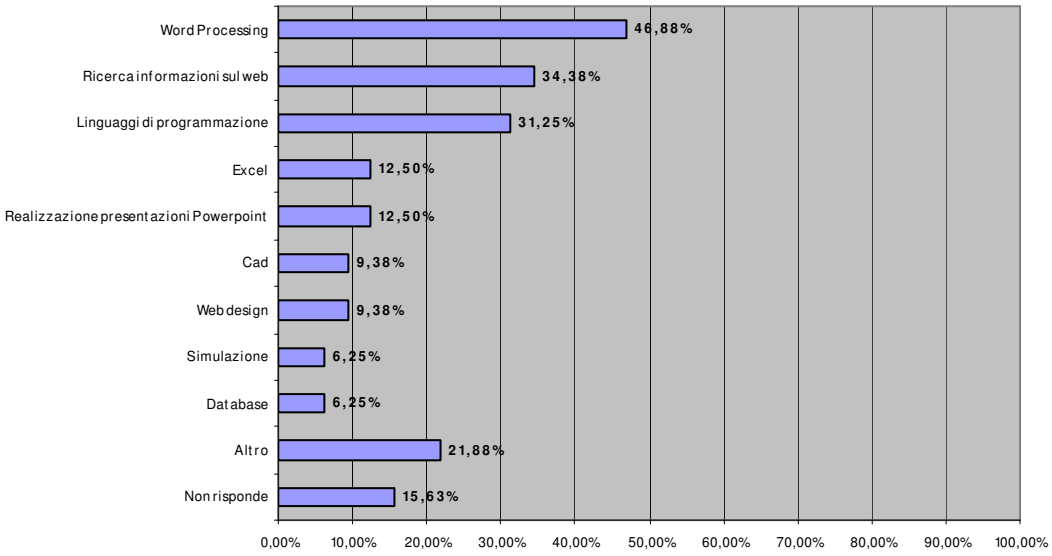
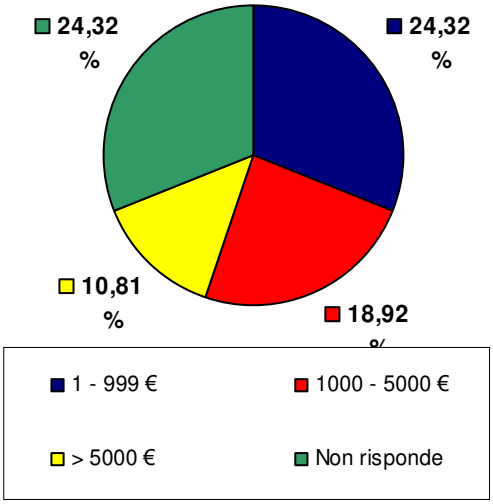
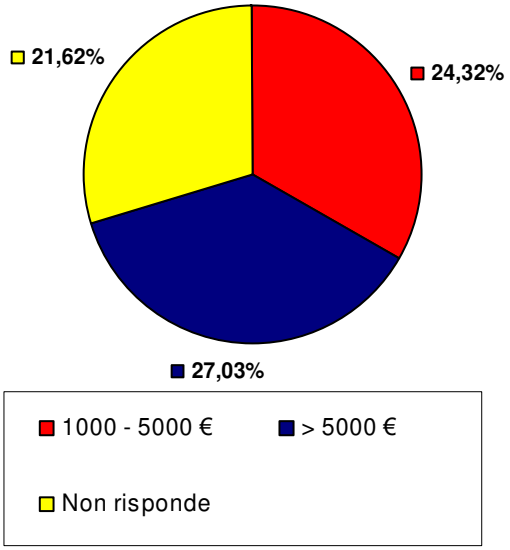


Fig.3.23: most common uses of computers in schools

One of the most common criticisms, by both teachers and students, is related to the updating of hardware and software on the computers. If there is not good teaching software installed, teachers don't use them, and if the computers are not fast and maintained, the students aren't able use them to their full potential. This is why it is so important to allocate part of the annual budget to new technologies. From investigations,

results show that the majority of institutions have an economic availability too low to cover laboratory needs, considering the cost of licenses and good quality computers: a good 24,3% of the schools have less than 1000 euro a year for software and less than 5000 for hardware.





Figg.3.24 and 3.25: annual budget for purchasing software and annual budget for purchasing hardware

However, the economic availability that exists for a school project in which new technologies are used varies. From time to time a project is proposed, discussed by faculty members, and eventually approved. Next, the amount requested is allotted or a percentage of this is given. Some institutions have a fixed percentage of the annual budget for this category, but only a minority of schools.

One part of the questionnaire was reserved for information about the availability of ECDL exams at the institutions; in 38% of the cases the school was an AICA test center and in the next few years several more schools will be accredited.

One of the positive innovations proposed was that of standardizing computer course contents, in able to offer a minimum of computer preparation that is the same for all. To this end, the European License is a natural candidate. 37,8% of schools interviewed say that they follow the ECDL modules in their computer classes, while 59,4% model the lessons according to taste and the skills of the teacher.

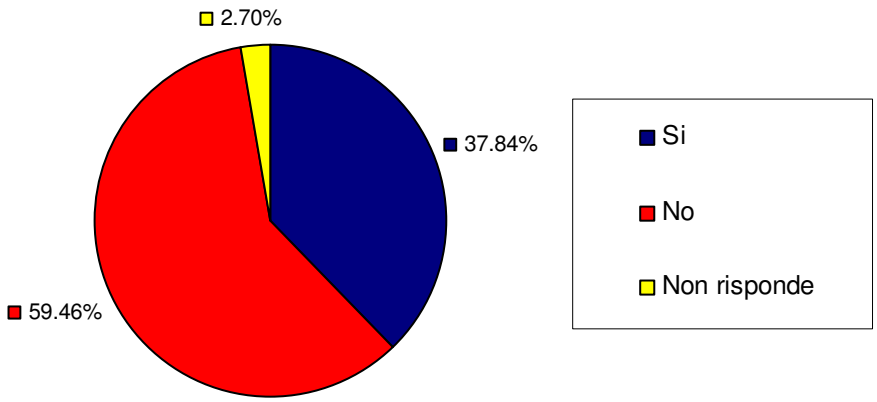


Fig.3.26: institutions with computer courses that follow ECDL modules

By visiting the schools, it was apparent that the computer labs remain empty for several hours a week, locked, with the only access being offered freely to teachers and students when they are accompanied by someone else. This tendency does not reflect positively on the development of new technologies in teaching, in as much as only free access to labs will give students the possibility to work on their personal projects, to let them be creative, and to self-teach even by making mistakes, without the judgmental eyes of the professor behind their back. The Italian tendency is to use computers only for didactic purposes and in the presence of a teacher who is in charge. 56,7% of the schools follow this pattern. Only 13,5% of the schools allow non-monitored access to students, while in the other cases access is authorized by a teacher (8,1%) or regulated by signing a log-in sheet present (2,7%).

On the other hand, students interviewed maintain that they would prefer lab access that is less problematic and with longer periods of time available, even in the evening, but they also felt the need for someone to supervise. If access is not monitored, accidents and vandalism would multiply given the lack of a sense of responsibility or the behavior of some students.

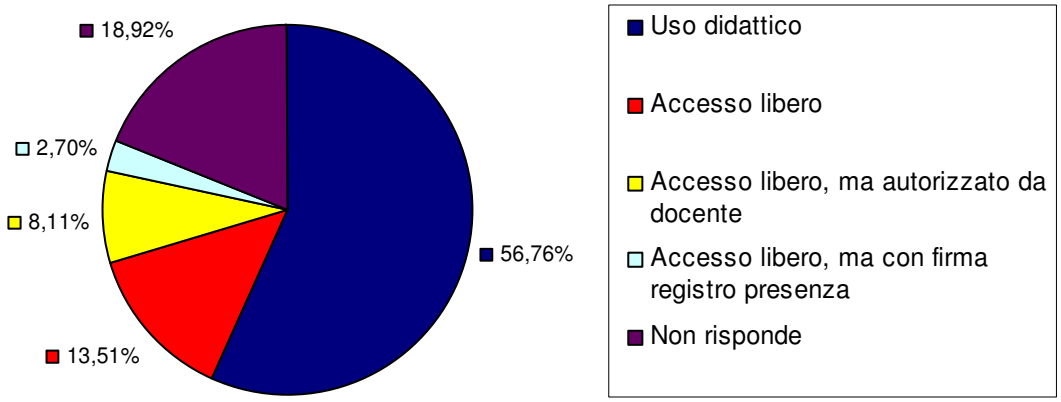


Fig.3.27: school policies about the use of computer labs

Even if students disagree about behavior found in labs, the teachers, on the contrary, promote it positively, sustaining that the majority of the students are motivated (42%), creative (28%) and diligent (23%) in front of the screen.

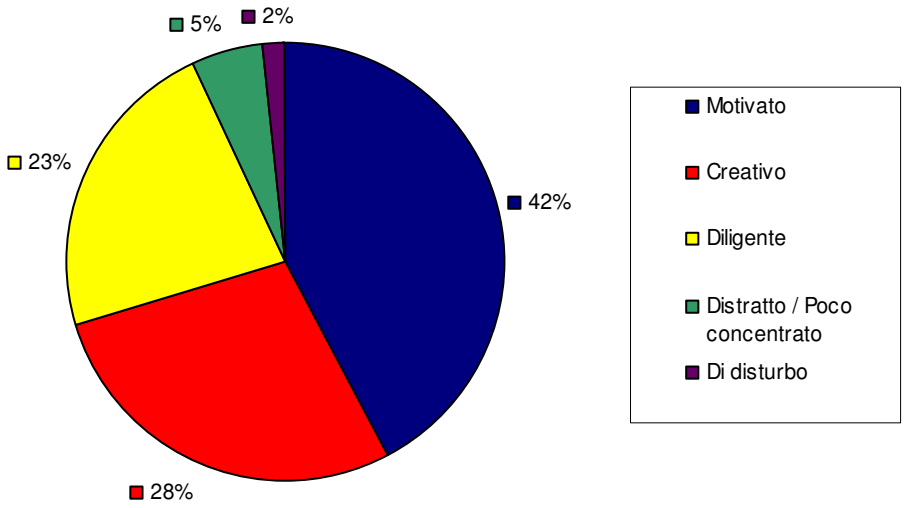


Fig.3.28: behavior of students in computer labs

Finally, they were asked to judge the interest and benefit of courses and activities regarding the use of new technology, according to gender. Often it was said that boys are

more skilled and interested in computers and everything that goes along with new technologies given that computer skills are necessary in every area. This data, if confirmed, could bring about future discrimination in the work world. From the questionnaire, some truth to these statements appears, in that part of the interviewees maintained (19%) that boys participate more and with greater benefit, while no one said the same of girls. In any case, the majority of the answers (57%) show that interest and benefit cannot be directly related to gender.

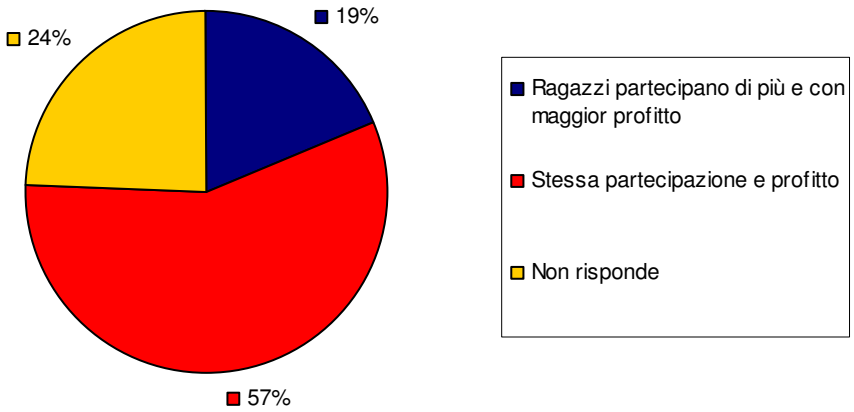


Fig.3.29: differences in interest and benefit in computers correlated to gender

3.5.2.3 projects and new technologies

With autonomy given to institutions, there is notable diversification within educational offers, and even new technologies have been called in cause, especially in reference to projects in which they play a major role. In the questionnaire, schools were asked about which projects they have completed that required the active participation of students and the use of ICT. The majority of schools answered (78.3%) that their web site was a project, even if, after close verification, it was proven that most of the sites do not have sections in which students can be active, like a forum, chat, or personal pages.

New technologies are also used above all as an aid to learning foreign languages (62,1%) and for the school newspaper (57,7%).

Important European initiatives like Comenius are not very popular (16,2%), mainly because of the bureaucratic difficulties involved in asking for and receiving funding. Virtual schooling and distance learning are also rarely available (24,3%).

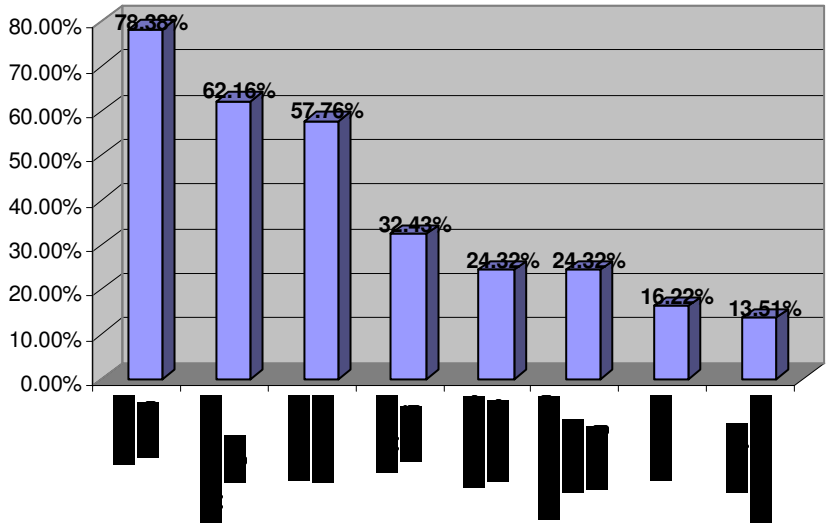


Fig.3.30: new technologies in school projects

Another important statistic is on the methods of financing for school projects: for the most part funded by institutional funds (34,1%), sometimes funded by the Ministry (17%), and local entities (12,2%) that support the expenditures. European funds and sponsorships account only for a small portion of the projects presented (7,3%).

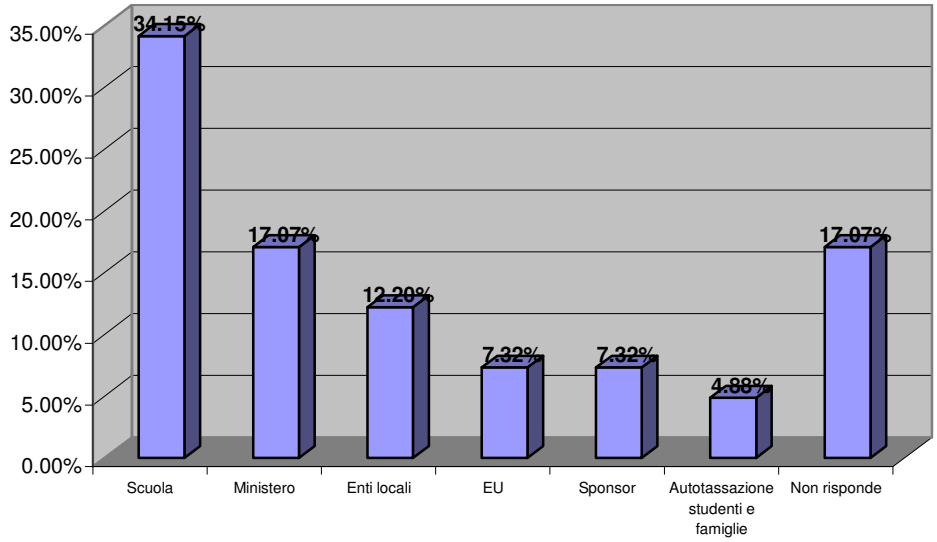


Fig.3.31: funding sources for school projects

In order to realize such projects, sometimes it is necessary to collaborate with other institutions or entities (43,2%). In this case, the entities are represented mostly by schools and businesses (42,8%), but also by universities (14,3%). The projects have multiple goals and motivations for their existence. The most common is to gain "familiarity with new technologies" (24,3%). Other notes include integration and cultural enrichment (5,4%), professional training (5,4%) and quality teaching (5,4%).

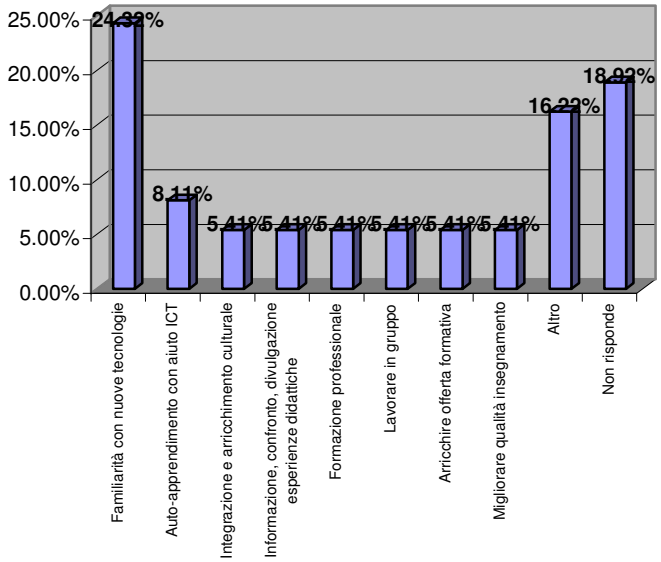


Fig.3.32: project goals

Another confirmation of the lack of interest toward European projects is the small percentage of institutions (16,2%) that declare to have participated in a European initiative or competition like Netdays, or that they are part of a European Schoolnet (EUN). In the majority of cases, projects are proposed by individual professors or by local entities like the city, province, or region. However, there is a desire to be more connected to other European institutions (89,1%), to participate in cultural exchanges, and to widen the horizons of cultural, linguistic, and social skills.

3.5.3 visiting schools

In order to have a more realistic view of the situation, and since it's impossible to visit schools in all the regions, a group of sample schools was chosen to be visited. The choice was based on the type of school, the size, and the geographic location. A total of seven secondary schools were visited: one in Bologna, in Emilia-Romagna, one in Florence, in Tuscany, three in Camerino, in the Marche and two in Rome, the capital. The type of institutions visited varied: three scientific high schools, two technical institutes, one linguistic high school and one professional institute. The schools in the Marche region were medium-small sized institutes, while the rest were large size schools. In general, the condition of the buildings was quite good, even if the majority of the buildings were rather old. In almost all of the buildings there were no network connections, even if modernizing efforts were completed only a few months before. One case that differed was that of the ITIS Belluzzi in Bologna, one of the few Italian schools in the "European Network of Innovative Schools" (ENIS). In fact, in this case there were network connections in almost all of the classrooms, that together with the multimedia kit, made up of a laptop, VCR and video projector, allowed the computer to be used as support in almost any subject.

The weekly schedule is such that students are present at school various hours during the day, from Monday through Saturday and always more common, during the afternoon. Usually students have curricular activities during the morning and extracurricular activities in the afternoon. In the afternoon there is almost always a scheduled time for computer activities. Students are in classes of about 20-30 each and the teacher moves from class to class to teach. They move outside of the classroom only for exercise or for non-traditional lessons. All schools have a classroom equipped for language learning, one for science, and at least one computer lab. In some types of schools, like a technical school, where there are many hands-on subjects, there are also different types of labs available. These classrooms are open only during specific times during the week, according to a set weekly schedule, made by the teachers that need the labs for didactic activities.

For example, in one of the visited schools, the computer lab was used only for five hours a week. During the rest of the time it was completely empty. If the labs are not widely used they don't bring a lot of advantages compared to traditional teaching. Furthermore, in order to open the labs, it is always necessary to call someone who is in charge, often the technician, who like all school personnel, has one day off during the week and therefore that day the lab cannot be used. Classrooms are equipped with a podium, blackboard, desks and storage for teaching materials, and in most cases they are exactly as they were tens of years ago. There are no computers in class, or an overhead projector, television, VCR or any other equipment. This shows that new technologies, not only computers, were used very rarely in teaching, and now they are being introduced mostly to follow European guidelines, not necessarily due to a changing desire among teachers. Prof. Giovanni Ragno, of the ITIS Belluzzi in Bologna, is satisfied with the situation in his institution where the use of laptops and video projectors during class is common practice, but also underlines that the price of such equipment is much too high for the majority of schools, with budgets that are not supported by sponsorships or other external financing.

3.5.4 interviews with Italian students

Students all agree that computers, and new technologies in general, can be used more frequently in schools. The reasons they are scarcely used is not, surprisingly, the ability of the teachers, that seems to be adequate, but rather the lack of space and lab personnel.

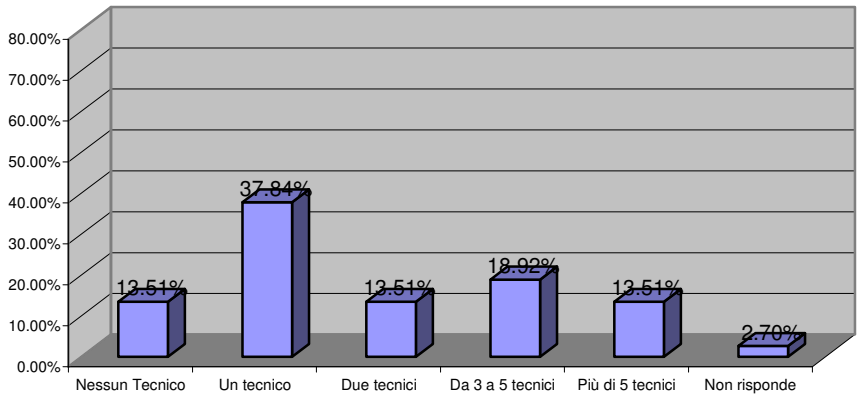


Fig.3.33: number of lab technicians per institute

Often the few available computers have problems, dated software, and the teacher, if an IT expert, is already overloaded with work so that he/she does not have enough time to maintain the network and the installation of new programs.

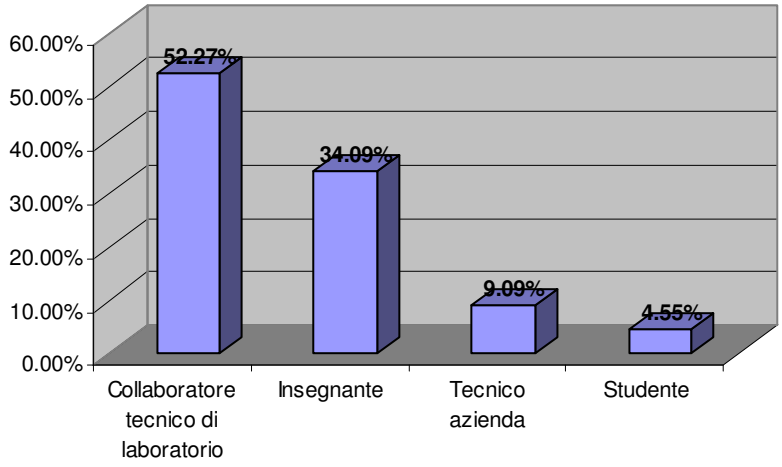


Fig.3.34: Who is responsible for the lab

All students interviewed were enthusiastic about the idea of keeping labs open during school hours, but also thought it necessary to maintain supervision, because the computer lab could easily be robbed or damaged. In this way, even students who don't have home computers could use one in the lab. "There is always a good atmosphere of collaboration within the computer lab, the most skilled students are always ready to help those that have less experience," says a third year student from the Higher Educational Institution "Costanza Varano" in Camerino.

The presence of new technologies is encountered in many subjects, especially as an aid in language learning. It's common to have a European partner school and to exchange periodically email or to meet on the Internet to chat, during some hours of class.

All subjects	37,84%
Only some	62,16%

Tab.3.5: IT presence in various subjects

The common opinion is that the enthusiasm, desires, and skills of students are not fully used: students are not called to play an active role within the school, only on a few rare occasions, mostly in technical institutes. The school web site offers information

mostly for visitors, but not for students and teachers, the majority of the users. "The site has not been updated for more than a year and the professor that created it has now been transferred, and now no one is in charge of the site," sustains one interviewee from Rome. Furthermore, the institute always has an e-mail address that is used in only 20-30% of cases. The secretary and the president receive large amounts of daily mail (flyers, letters, questionnaires) and often they don't have time to check and respond to e-mail. Students propose the possibility of having space within the school website where they could create their own web-pages or discuss important topics in a forum. Furthermore, they would like to have quick access to useful daily information (school calendar, homework, required books, addresses of teachers…). Regarding computers and linguistic skills, interviewees maintain that "*English is not a problem in navigating the internet and in using applications that are not in Italian, but can be a problem when discussing directly with other users connected from other European schools.*"

The rise in home computer use is also notable, even though usage is mainly for entertainment purposes: many young people write notes on the computer and others say they prefer typing to writing. The most used and well known programs are Microsoft Office, Internet browsers, and software for email, especially Outlook Express. Very few know Linux and even fewer have it installed and use it on their own computer.

3.5.5 opinions of teachers that use ICT

Scientific high schools were one of the first types of schools to benefit from the National Computer Plan that began in the early 1990s. The plan allowed for starting a computer class within mathematics. Two years were dedicated to introducing programming languages, Pascal for example. In the next three years algorithms and data structures were introduced, as well as more advanced programming, especially the use of functions. Reference software varied, but the most common was Derive. Today, nearly a decade later, the plan is still part of school curriculum. According to Prof. Giuseppe Ercole, of the scientific high school in Camerino, *"the approach adopted by the plan is good for scientific study, and is now integrated with Internet use, especially for scientific*

research. For other areas, redundancy of information is a problem, too much to choose from. Students do not yet have critic abilities necessary to distinguish from useful and useless sources of information." Regarding computer use for class assignments, the professor added that "*computers are only used for group exercises. The problem with testing is structural: the lab has 25 computers and some classes have 30 students.*" According to Prof.Curzi, of the Technical Institute "Antinori" in Camerino, "*above all, the problem is a lack of appropriate software for giving and evaluating in-class computer assignments, especially open answer test questions. It's easy to prepare and evaluate multiple choice tests, but they are not the only kind of assignments given to students.*"

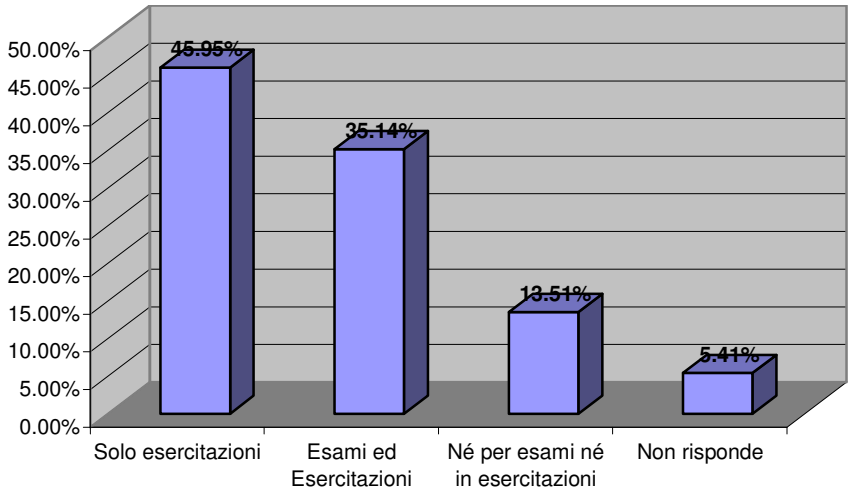


Fig.3.35: the use of computers in exams and exercises

Another problem posed by many teachers is the varying abilities of students that have a home computer, and therefore the possibility to practice at home, and those that only have access to a computer at school. Compared to many years ago, the situation is much improved: first the classes were divided by a few "computer geniuses" and several "unskilled", today only a few students per class do not have a computer at home. If this trend continues, in a few years, the differences will no longer exist, but today it is still necessary to offer the same opportunities to the minority of students without home computers.

3.6 Case Studies

3.6.1 ECDL Italy

3.6.1.1 the history and development of ECDL in Italy

Today, the possibility to prove one's computer skills is of primary importance. It's not enough to state one's abilities, one must be able to prove in an unequivocal way the knowledge of fundamental computer concepts and the ability to utilize the most common applications. The European Computer Driving License, is the solution to this need, and has become, in the time span of a few years, the standard international certification that, once issued after a series of exams, proves the acquired competency. The ECDL Foundation, with seat in Dublin, is directed by CEPIS (Council of European Professional Informatics Societies) that ties together computer associations in Europe. In this scene, Italy is represented by AICA (Associazione Italiana per l'Informatica ed il Calcolo Automatico), that has the job of assigning the requirements of "*Test Center*" to organizations that ask and giving the appropriate certification. The ECDL began in Italy right after the construction of the ECDL Foundation. The first licenses were issued at the end of 1997, even if the European Computer License remained an unheard of concept to most. After a slow start, it quickly became widely known. A decisive push came in December of 1999, given the underwriting of the protocol between the Ministry of Public Instruction and AICA to diffuse, even through schools, the certification of computer capabilities according to the international standards of the ECDL, and to define a "competency document" to insert into new scholastic curriculums, or in other training initiatives promoted by the Ministry. With the underwriting of the protocol, there will be the possibility for schools to become Test Centers if they meet the requirements. Students can be certified at school and certification can be used as educational credit and a better way to enter the work world. Accredited institutions can also offer exam preparatory courses to students from other scholastic institutions, offered for a fee or for free, according to individual choices by school operators (POF). Another decisive push for the diffusion of the ECDL was given with the agreement made in April 2002 with

Italian Universities (CRUI) for computer literacy for all first year students. Currently, there are more than 2200 accredited exam centers located all over the national territory, and more than half of these are located in secondary schools and universities. The support of the Institutions allowed the European Computer License to be diffused among young people thanks to networks of schools and universities. One demonstration of this is the average age of those that have obtained the ECDL: a good 44,71% is between 20 and 29 years of age, and 16,33% between 10 and 19 years of age. The results are not yet satisfactory regarding the adoption of the ECDL as a certification in the industrial world. According to Dr. Franco Filippazzi, head of the ECDL in Italy, this is due to an existent cultural business question: in Italy, differently than in Anglo-Saxon countries and in Northern Europe where training and certification of employees is a business priority, it is considered a cost rather than an investment. There are few exceptions in the Italian panorama: until now, among the biggest companies, only ENEL and the State Railways have adopted the ECDL standards. In order to fix this delay, and as an incentive to companies that offer certification, there are new initiatives in the area of Public Administration; one explicit reference to ECDL certification is in the "Action plan for e-government", approved by the Counsel of Ministries in June of 2000 and reconfirmed in the planning documents of the Ministry of Innovation and Technology in June of 2002.

3.6.1.2 ECDL certifications

The ECDL program is aimed at various levels of users, ideally reaching a pyramid that goes from generic users to professional users. The proposed certifications are the basic ECDL, ECDL Advanced and ECDL "*Advanced Specialist*". For the basic course, to get the license, the candidate must get a Skills Card at one of the accredited centers that is valid for three years, in which personal data is registered as well as the exams that the candidate has passed. Then, the candidate must pass the seven exams in the Syllabus, the basic document that by now is in its third version. One of the modules is theory based and six are practical; the exams cover, respectively, "Basic Theory Concepts of Informational Technology", "Computer use and file management", "Textual Elaboration", "Electronic Files", "Databases", "Presentation instruments" and "Computer

networks". The candidate can take the exams at any accredited center, even privately and in whatever order preferred, presenting the Skills Card as I.D.. After passing all the exams, the candidate receives the AICA certificate. The entire cost of the license is about 120 euros: 50 for the Sill Card and 10 for each exam.[Pas02] Recently, given the increase of demand, a significant element of expansion has been introduced in ECDL certification. The ECDL advanced certification, for evolved computer users and constituted of two levels: applied and specialized. In the first level it's possible to obtain an advanced level of knowledge regarding modules three, four, five, and six of the basic ECDL. The modules are independent and allow for the acquisition of other Skills cards. The exams can be taken at any of the Test Centers, which are a few hundred in number, spread throughout Italy. The second phase, the specialized, is in the pilot stage. Italy, together with Greece and Ireland, are developing this project. In this case, the group of users is almost completely professional. The license prepares the candidate for the training and organization of a LAN in a small company. The participants are "super users", as they are called, and are instructed on not only technical aspects but also communicative and social aspects since they must be able to make and communicate decisions, as well as provide presentations. Among other assignments the user must know standard office software, utilizing the most complex functions, administrate network systems that are moderately complex, effectuate research repairs and high quality maintenance and be a go-between for professionals and ICT providers of software and hardware. In order to train the candidates, since it is aimed at a small group of users and more specialized than previous levels, there is no need for a Test Center but rather a Training Center. About a hundred of these should be necessary for the project to begin. The structure of the course is modular and there are seven exams; five are about advanced aspects of networks and allow for the "super user" certification: "Hardware", "Operating systems", "network services", "Advanced use of networks" and "Security". The last two, independent from each other as in the first advanced level, are about CAD and "Web-design". In giving a concluding view on ECDL certifications, it's useful to give some idea of the amount of training time necessary for each level. For the basic ECDL each module requires about 20 hours of work, the first advanced ECDL requires about 30-40 hours, while the second advanced level requires about 100 hours of training.FilOcc02]

3.6.1.3 data, statistics and new ideas in ECDL Italy

ECDL Italy within the European landscape is one of the most active organizations. Its contribution to research and development of the program and local results are more than sufficient. The ECDL Foundation, in its annual reports, classified Italy in second place after the United Kingdom, based upon parameters regarding the diffusion and development of the ECDL. The numbers and statistics are fundamental, in the picture, above all considering that the Foundation is sustained economically by a tax on every Skills Card issued. As seen previously, ECDL was fully introduced in Italy in 1998, even if the first graduates were in 1997 Since then, about 380,000 basic ECDL certificates have been issued.

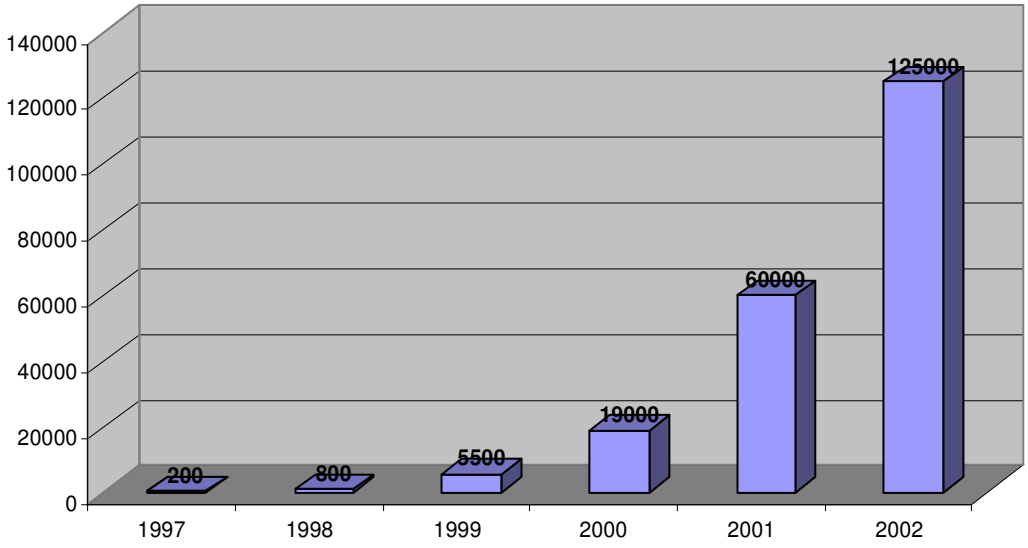


Fig.3.36: number of basic ECDL certificates issued

There are more than 2500 Test Centers and about 1500 of these are located in high schools or universities. AICA didn't have to do a lot of publicity campaigns to promote the program: the agreement made in 1999 with the Ministry of Public Education guaranteed that information was given directly within the institutions. In following years, ECDL grew to even greater proportions, above all among young people, and even the editing market has seen positive results. There are multiple manuals and guidebooks, and the AICA directors for the validity of didactic materials have made sure that the manuals

respect the Syllabus of the program, even though there is an overabundance of teaching materials. The exams for the ECDL modules follow an automated method introduced in April of 2001. After a period of testing in universities in Milan, Alice, the name of the exam procedure, was approved during an AICA meeting in Milan. The adoption of this system was motivated by the obvious advantages of an automatic system for grading, but also by the need to reduce the amount of time necessary to grade the exams. Since January 1, 2002 the Alice exam procedure is obligatory in all schools: Test-Centers that don't want to or are not able to adopt such procedures will loose AICA accreditation.[LaPa02]

The Alice system offers the advantage of being able to produce statistical data easily and in an automated manner, that once studied, allow the system to be improved and calibrated even more accurately the level of difficulty and length of exams. It's also interesting to note, for example, the number of candidates promoted according to the various modules of the basic ECDL . The average percentage is high (about 87%), with a peak of 94% in the two modules considered among the most difficult: the fourth regarding spreadsheets, and the seventh, on networks. It's amazing, on the contrary, the percentage of those failing (22,8%) in the exam for the third module, on word processing. Probably, explains Filippazzi, the module is taken lightly and studied little, since most assume to have a great amount of experience in the writing of documents on the computer.

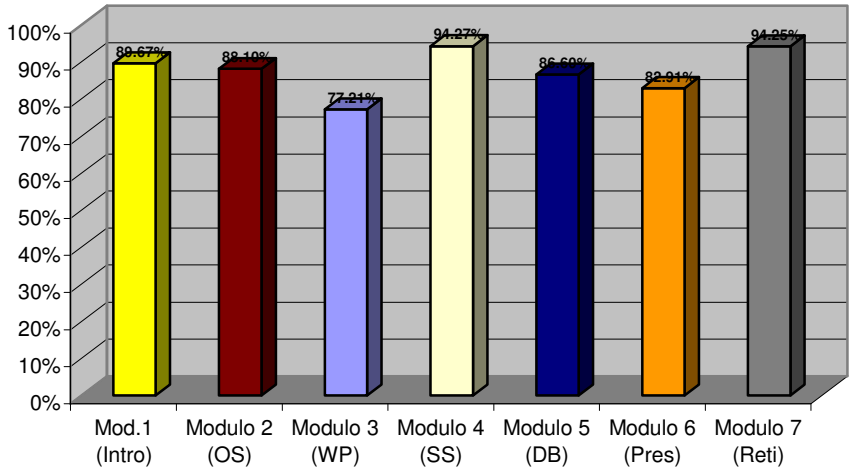


Fig.3.37: passing percentages in ECDL exams

ECDL Italy keeps a close eye on the going market in order to propose innovations; the meeting in Rome the 27th of November, 2001 was an important occasion to bring to light the current situation and to open up new perspectives on the Italian ECDL. The biggest novelty of the meeting was related to an opening towards the world of "open source" software. The construction of an AICA work group was announced that will include the participation of interested teachers and above all it was clarified that the Test-Centers that want to certify ECDL skills on non-Microsoft software can do so with a special request to AICA. Among the operating systems (second module), Linux was mentioned, while other proposed applications were Star Office and Open Office (for modules, three, four, five, and six) and Eudora, Mozilla and Opera (for module seven).[LaPa02] The ECDL syllabus is independent of the software used, even if until now the exams were primarily taken on Windows, with Microsoft Office software. Today it is possible to take exams with different platforms, even if the procedure is not automated but manual. AICA intends to adapt it as soon as possible for Linux systems with Open Source software.

3.6.2 innovative experiences in Emilia-Romagna

3.6.2.1 a leading region in technological development

On the international scene, Italy is certainly not distinguished as a forerunner in technological developments, and many of the innovations in these files have arrived in the last few years, based on models of other European countries. This doesn't mean however, that significant experiences or innovative projects do not exist. The Emilia-Romagna region has always distinguished itself among other regions, for having developed many high-quality experiences in the field of services offered to citizens, in research and teaching. In particular, for technological development a huge contribution arrived with the Technological Laboratory in Parma, the Criad in Cesena and the Marconi project in Bologna. This last, especially, was born in 1991 for the integration of handicap students in didactic activities, and to reach these goals technological instruments were used. Not long after, computers were expanded in all areas of education. As a structure,

the Marconi project depends upon the Emilia-Romagna region, and about ten teachers work on the project from all scholastic levels. Currently two are from elementary schools, four from middle schools, and the rest from high schools. A number of services are offered: technical consulting services to the schools were the most requested, above all at the end of the 1990s when the internet phenomenon came about. Very few institutions had advanced technicians available and so they relied upon the Marconi experts for the realization of local networks, for the analysis of the capabilities of a system or simply advice on purchasing equipment. Today the consulting services have been greatly reduced, given that knowledge of this type is fairly diffused, but the group is very active in the field of training, where there are many requests. For example, in 2002 the Fondazione Cassa di Risparmio gave 1000 computers to schools in Bologna, and the Marconi project offered to train 150 teachers, from the schools the received the computers.

One of the events that requires a lot of preparation and organization is the school conference , now on the sixth edition, that is held every two years in the city. The first edition was in 1993 and from that year the conference is fixed on school agendas, which then have the possibility to present experiences, create collaborations and discuss new ideas. Each institute creates some sort of presentation area, and the program allows for seminars, workshops and demonstrations on the use of new instruments in teaching. According to Giovanni Ragno, since 1996 the Marconi project "*is the event that has contributed most decisively to the knowledge of and opening towards new teaching methods. All of the experiences are presented in ways that are not too theoretical, but intuitive and essential; this allows the participants to understand right away how to put ideas into practice and favors the wide circulation of information among all those present*". One example comes from an Italian teacher, who knew nothing about computers and technology in general, but who participated in the event by chance, and went with her son. After seeing a demonstration on how her subject could be taught with the help of new technologies, she declared that a whole world opened up, previously unknown, with enormous potential. During the same period in which the first School conference was held, Kidslink grew in Bologna, which then would be the driving force of all successive experiences. It was born almost by chance, from a reform that reduced the

number of teachers of technical education and instituted a technological operator, whose job inside the school was yet to be defined, but had something to do with new technologies. To study the question, teachers, in love with computers, decided to create a group, called Arci Computer Club, and to meet together periodically to discuss new ways of teaching. Among these there were some collaborators from the CNR of Bologna that gave members the possibility to use new technological instruments, in particular telematics, at the Research Center. In short, a Unix server at the CNR was realized, dedicated to schools, and then written in an agreement with the Research Center, the Arci Computer Club and the City of Bologna. Kidslink was born. CNR made available the technical skills, the Club made available the place and the City covered the expenses for the necessary line. From that moment on, innovative experiences multiplied, and today many other regions follow the same model, helped also by the emigration of some of the Kidslink pioneers to other cities or by the Marconi project, for example, the Formicaio project in Udine, in Friuli Venezia Giulia.

Today, also thanks to European programs and huge efforts on the part of the Italian government to innovate schools, there are no longer huge differences among various regions. Emilia-Romagna, with its strong traditions from at least ten years in the subject, can be a good guide for others, working towards the goal of creating a high quality schools in step with the times.

3.6.2.2 updating teachers about new technologies

The Plan for Development of Didactic Technologies (Il Piano per lo sviluppo delle Tecnologie Didattiche-PSTD) created the basis and the infrastructure for applying ICT in teaching. Now, with the ministry circulation 55, of May 2002, the second phase of the plan is now in order, reserved for the updating of personnel on new technologies. The training of teachers at three competency levels is programmed: “A”, for those who do not have practical experience with ICT; “B”, for those who have used information systems in the past; “C”, for teachers specialized in the use of ICT, that will be assigned to network administration and the training of other teachers. The project is instituted by the Ministry of Education, University, and Research, but also requires active participation

by all school systems, with specific reference to Regional Directors and connected agencies. Emilia-Romagna, an Italian region that has always distinguished itself for organization and sensibility to innovation, has already organized to overcome this new obstacle. The region is at the forefront also thanks to the contribution of institutions like Criad in Cesena, the Technological Laboratory of Parma and the Marconi Project that have always collaborated with the development of high quality education and a high cultural level. This favorable climate is valid not only for teaching, but also for other services to citizens: the capital, Bologna, has earned the appellative of digital capital, thanks to the Iperbole network that was the first in Italy to provide free access to the Internet for citizens. In such an atmosphere, it's not a surprise to learn that the region is among the few in Italy to have instituted, specifically for the updating of teachers, a full-time professional figure in charge of developing the project. Furthermore, about twenty people are perfectly synchronized to work on the project, a couple from each province, which lightens the work load of the central administration. The method has worked perfectly, also because the individual provinces know the local realities like no one else, and therefore are the most qualified to make decisions about the territory in question, without having to go back through the central seat. Regarding the national structure, the general guidelines proposed by the Ministry, Invalsi takes care of the organizational aspect and Indire the didactic materials. Even universities collaborate to make the program work, in particular the departments of engineering and computer science, above all for the training of level C experts. In comparison to other regions, like Lombardia, that made agreements with private companies in order to continue the project, Emilia-Romagna did not use the private sector, even if different groups would have liked to have participated. The Regional Director had the assignment of promoting and coordinating the work in schools and the network of schools for the level "A", and to create a relevant training program for levels "B" and "C". More specifically, for all levels of training, the Regional Director had to create programming, coordinating and support task-forces to organize an investigation on the training needs and to conduct constant surveillance of the situation. Other recommendations were then differentiated according to category. For level "A", the recommendation was to activate and finance a number of training centers sufficient for the number of courses that needed to be offered. These are usually

secondary schools that are appropriately equipped and with the right number of personnel able to offer the courses. For level "B", to activate, even through agreements with research institutes, universities, associations and using the support of the IRRE, an entity capable of producing the training program, both in terms of the planning and realization. In regards to level "C", in the end, the order was to reach the same goal, even through agreements with specialized centers and companies. For categories "B" and "C", given that the program must be qualified, the resources must necessarily be concentrated in only a few entities. [Miur02c] For Emilia-Romagna, the Ministry has designated 3.5 million Euro that will be used for the 561 scholastic institutions present in the region. In the end, the amount is sufficient according to regional directors of the projects, even if there have been delays in starting the courses because the funding, already designated, has not yet been distributed. In particular, the 2002 Finance law slowed down the process, due to numerous cuts. Hopefully many of the 40,002 teachers present in the region will soon be updated. Nearly 10,000 will take the basic course, about 1000 will take the level "B" and less than 300 will take the advanced level.

Type	**Number of teachers involved**
A	9520
B	849
C	272

Tab.3.6: number of teachers to update in Emilia-Romagna

As shown in graph 3.38, there were a high number of requests to participate in the courses, more than what was initially expected. The requests for level C, in particular, greatly out numbered the available places, showing that many teachers in the region have already acquired a good knowledge of new technologies. Even in other Italian areas the tendencies remain the same, even if more noticeable in Emilia-Romagna. Teachers that are not able to have access to a course now have been put on a waiting list, and will take a future series of classes.

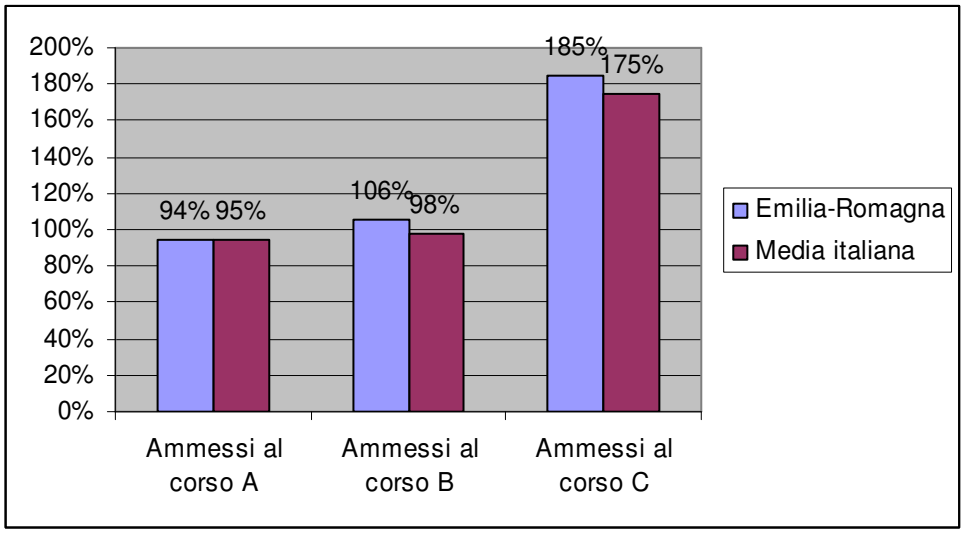


Fig.3.38: requests for admission to courses A,B, and C (source Invalsi Monfortic 27.1.03)

The updating process will not end this year, but will continue, even if in a smaller way, in future years, following the same program and taking advantage of suggestions that will come from an analysis of questionnaires that will be filled out by those who take the courses at the end of their training period. In regards to courses to teach, there are 433 for level "A", each with 22 participants, 50 of category "B" and 16 of category "C", each then divided in two sub-levels, C1 and C2, each with 17 participants. In each school that is deemed suitable, three courses will be activated, and the Regional Director must choose 167 schools to reach this goal. Once the training centers are found, the calendar of lessons can be scheduled and participants can be selected, didactic materials will be produced and participants will be instructed on how to use the resources for self-training. The enrolment matched the requests: levels A and B are almost full, while those of type C are running behind, and so there are still many places available. The province of Piacenza is that which has proven to be most interested in the first level, with an average of 20.16 enrolled, while the area of Forlì has the most participants for level B training (17). Overall, the region had a very high average level of computer training, given that there are a large number of course with less than 5 participants signed up for level A.

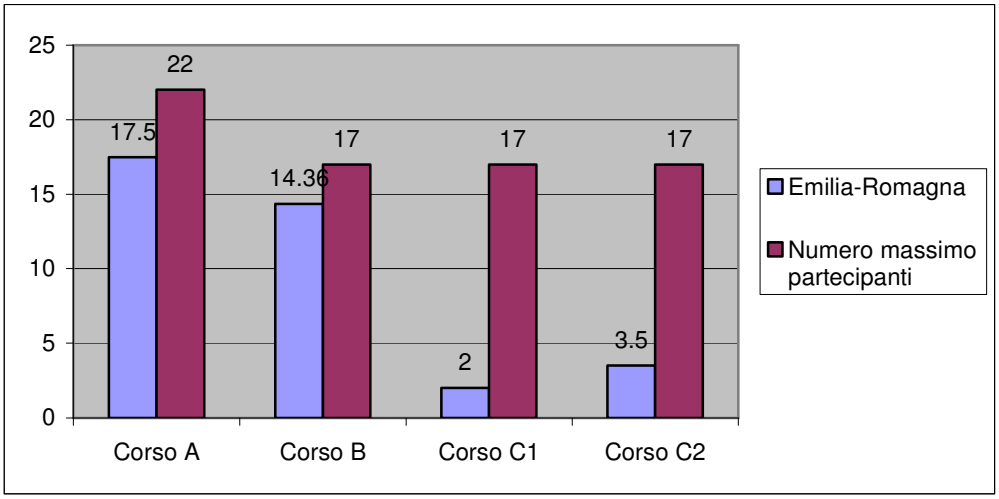


Fig.3.39: average number of participants in each course (source Invalsi Monfortic 27.1.03)

The training centers do not receive compensation for each course activated and for the counseling activities offered.

For each institution	1290 €
For each course type "A"	4800 €
For each course type "B"	7750 €
For each course type "C"	15490 €

Tab.3.7: funding distributed to selected institutes

The initial phase of organization, the making of the course lists and signing up of participants, that divided the procedure into four phases, requires the use of Internet. In the first phase, those admitted are noted, and through a system with a password, teachers are registered, with the forms they have chosen, and their email, for direct communications. There also exists a paper version of admission, available through the Regional office. The second phase includes the construction of a list of scholastic institutions and available institutions able to run the classes. All of the institutions are inserted in a database, and the directors are sent a password to access the system. The course directors are responsible for the third phase, in which the list of courses is determined. The last phase involves the selection, by the teachers, of the available seats and of the level of course. Once accepted into the system, a letter is automatically sent

restating the choices made, shown by a code, and giving the starting date of the training. Once the organizational part is formed, the course is activated, given a director and someone in charge of organization. The participants are not left alone in the learning process; besides the network help present, there are a couple of tutors present in each classroom. The organization process is rather complex, but must be completed within three months, between October 2002 and January 2003. According to Inspector Luciano Lelli, in charge of implementing the program in Emilia-Romagna, the biggest obstacles are of a technical nature and the system has proven rather rigid. After some useful variations, a version was reached that is useful for all. The initial project, working on paper, was modified several times as problems arose. This type of approach did not create problems, thanks to the efficient organizational structure previously created. One of the aspects that must be reviewed in the future regards the excessive number of passwords, inconvenient to use and remember. Having to then write them down on paper to use in the respective areas, the reason for which they were created is lost: security. At the end of the presentation of the vast teacher training program, one wonders if this will create the decisive push necessary for the application of new technologies in teaching. Probably other components must participate in order to reach this goal, even if the success of the program will surely contribute to raising the general level of computer education. Following, attention needs to be directed towards the use of computers in teaching, and changes need to be made to the basic curriculum of each course. At the moment though, it does not appear possible to understand the direction of the next strategy, given that much depends upon funding available.

3.7 The Future of Italian Schools

Searching to understand what will be the future of education systems in Italy seems to still be a very difficult job, considering the slowness with which the Italian system effectuates reform. The present seems full of uncertainty, even if many valid strategies have been proposed and substantial ideas, among which those for technological innovation. The primary obstacle, as often happens in Italy, is tied to the realization of

the projects, and is mainly tied to available funds. At present, government financing for education is not sufficient to guarantee high quality schooling, and what happens, year after year, is an increasing number of budget cuts. The problem affects all the educational cycles, from elementary to university, and hits many research centers as well. It's futile to seek to realize operating plans, fully autonomous, with the guarantee of an economic base with which to work. If the system truly should be uniform to that of the rest of Europe, first of all, the subdivision of schools into different categories should be avoided, wealthy schools, city schools and poor schools, mountain areas or in areas that are less productive; and the salary of teachers must be raised, which is among the lowest in Europe. On this point, one of the most innovative points inserted in the scholastic system is that regarding the autonomy of the schools for the realization of ideas, projects, and formative activities. The road taken is the right one, given that this frees schools from many bureaucratic obstacles tied to a centralized system, and allows for the study of an educational offer that also accounts for regional cultural characteristics. Unfortunately there is also a negative side, which is tied to economic factors: a system such as this also favors institutions in big cities, wealthier and with more contacts with businesses, respect to those in mountainous or poorer areas. Many studies have been completed, and even previous questionnaires show clearly how schools with more resources are found in wealthier areas. A key goal for the future of Italian schools is the possibility to give everyone the same learning opportunities, indifferent to area of residence and family income.

From a technological viewpoint, in the last ten years many huge passes have been taken, and the strategies of PSTD have proven to be a great success. At the moment, it is not possible to evaluate the impact of the global program of updating teachers in new technology subjects, given that the courses have been active for a short period of time and therefore new material will be put in practice beginning next year. In any case, immediate results cannot be expected: the process of assimilation is long, and all participants must acquire first hand experience. Italy, according to an interview with Minister Moratti in May 2002, looks to the Finnish model, which resulted as the winning model in the PISA research (see paragraph 4.3) for innovation in educational systems. At the same time, Finland also declares to want to learn something from Italy. According to

Jari Jokinen, leader of the program eEurope for the Finnish Ministry of education, the Nordic spirit, more practical than the Mediterranean, contributed to a fast realization of good results in the field of didactic technologies, even if, after initial enthusiasm, the growth rate has slowed considerably. This does not favor reaching the goal, which is that of applying globally new technologies to all age groups, in all fields. The Italian method, on the contrary, more complex and speculative, could bring about better results in the long run, allowing for a lasting application of the innovations.

The next step to take will certainly be towards the integration of new technologies in curriculum, an obstacle that no European country has yet to overcome, but one that all are considering. Course curriculum must be reformed and adapted without losing sight of the true educational objectives. One suggestion, in this case, is from Prof. Giovanni Ragno, of Belluzzi in Bologna, one of the schools that belong to the "European Network of Innovative Schools". According to the teacher "now that the infrastructure has been realized, it is fundamental to think about the integration of new technologies in curriculum. The best proposal is not to supply a standard model, valid for all subjects, on how to use the computer in the class room, but to supply guidelines, different for each discipline, within which the best usage of new technologies in the classroom can be found. Here the experience accumulated in these years by innovative teachers is fundamental, they must collaborate to suggest the best practices to follow." In mathematics, for example, the best programs to use will be suggested for the study of functions, geometry and algebra. In language, it will be fundamental to integrate traditional lessons with the use of communications instruments, like email and web conversations, for interaction with other European institutions. Furthermore, many programs will be proposed to use as evaluation instruments, alternated with traditional testing. The auto-immunization of evaluation, with multiple choice testing or open answer, must become a common practice in the schools of tomorrow, favoring objective judgment by the grader over the subjectivity of the professor, often contested by students.

Some useful suggestions for the next strategy come from Inspector Lelli, of Emilia-Romagna, who sustains that technological renewal will continue, even if funding will not be massive. A good practice to introduce should be that of furnishing each school with a certain number of laptops that, together with networks present in each

classroom, would favor lessons using the computer, not always having to transfer the class to the computer lab. The computers could be borrowed by who needs them, teacher or student, and then once used, returned to be available for the next use. This model is already in action with success in some schools in Emilia-Romagna, where a multimedia kit was purchased, made up of a portable computer, video projector and video recorder, placed on a stand that could be moved from one room to the next according to the needs of the class.

CHAPTER 4

4.1 The Two ICT Educational Strategies Compared

Thanks to the European Union, the previously diverging paths towards innovation of two countries so unlike each other as Finland and Italy, are now coming together. However, the European program of innovation is quite different between the two countries. In Finland, the decisive push was given by two main reforms: the first, concerning the scholastic curriculum, took effect in 1985, and the second, starting in 1992, dealt with cultural and instructional financing. These reforms were the result of a change in the social values and objectives; they were further motivated by the fact that cycle of compulsory schooling did not provide every student with the means necessary to advance to instruction at a non-compulsory level. An inadequate level of preparation for the changing needs of the work field was also to blame. Furthermore, school administration was too centralized, excessively bureaucratic, and founded on the strict control of municipalities and schools. [Tel98] The scholastic system conformed quickly to the new norms and has prospered immensely; with it the work field has also developed, thanks to a new generation of workers prepared to meet its needs. Italy also suffered in the same situation as Finland before the reforms and discussions as to which changes should be made to the system were rampant. Numerous proposals were made and many were actuated, only to be abandoned with the frequent change of the government and the department of public education. Presently, after more than a decade, the social, cultural, economical, and cognitive revolution, brought about by the information age, has shed even greater light on the inadequacy of the system. However, we still cannot speak of an authentic reform, which is why Italy has been placed among the last European countries in instruction, according to various surveys (see 4.3).

This basic difference in reform is essential to compare the two situations; if we consider the local didactic innovation strategies, we will see that they are for the most part similar, seeing as both countries follow the European directives included in the eEurope program. Naturally, there are also individual themes, which reflect the local realities. For example, the development of global connection and distance learning are

primary objectives for the Finnish, who strive to offer the same possibilities in communication and learning to those inhabitants of rural areas or residents of foreign countries. The Italians, on the other hand, give priority to updating infrastructures and the teaching staff to new technologies. We can witness the progress of the program according to many indicators of the Euro barometer. This type of comparison, however, is not considered very significant, in that the true difference lies in the starting points of the two countries: Finland, with an educational system ready to meet the cognitive demands as well as those of the new market and Italy, still heavily tied to the past. From this perspective, the European programs for the advancement of information should have first standardized the educational system of each member country, or at least brought such system up to par with the demands of a new era. Only then would concerns for the technological infrastructures and staff briefing be justified. Nevertheless, in an effort to compare the present state of the didactic innovation of the two countries, it is safe to say that Finland, not without numerous problems, is further developed compared to Italy.

The first Finnish strategy for the development of new technologies, lasting from 1995 to 1999, had, with considerable investments, tried to introduce information and communication technology into every aspect of public life, including that of education. When the first Finnish strategy was first implemented, Italy also disposed of a multitude of valid innovation projects, but it would still be two years before the first of these, the PSTD, could take effect. Today, following the success of the first strategy, which brought about the creation of infrastructures, Finland has entered the second phase, which will last until the year 2004. This phase has the primary goal of developing the contents and the new paradigms of virtual schools and universities. Italy, on the other hand, despite the milestone of innovation that was the PSTD, can still not boast excellent infrastructures but must worry about proper faculty preparation. Considering the vastness of the endeavor, the program is limited to faculty preparation and there is no mention of virtual study or development of multimedia content, as in the Finnish model. Moreover, unlike the Finnish strategy, which is based on a five-year-period, the Italian strategy is annual; once this stage has been completed, focus will switch to other aspects that will probably, considering the demands, reflect those of the Finnish. This different method of programming can be explained by the greater educational funds of the Nordic country

and a general difference in mentality. Also, the implementation of a change in a nation of little more than five million inhabitants is surely much easier than one of more than sixty; in Italy it would be senseless to attempt to actuate and predict the outcome of numerous changes when it is clear that it would be difficult to adhere to and receive the general consensus for just one aspect of the change. As usual, the most relevant aspect concerns the economic side: plans can only be made on the basis of what funds are available. Italy, thanks to the UMTS auction, has had a great economic opportunity to bring its teaching staff up-to-date, but over the next few years these funds are believed to be destined to decrease, making it impossible to plan anything in advance.

4.2 Remarks on the Finnish Educational System

After acknowledging the fact that no educational system can or has ever been perfect in every way, an obvious first step to make is that of trying to understand what the limits of the Finnish system are, and, if possible, to suggest improvements with the help of the educational models of other countries. Finnish researchers have always worked to this effect, proposing reforms based on the German model, and more recently, on those of the other Nordic countries, particularly that of Sweden. The goal of the Finnish educational system is that of guaranteeing equal opportunity of instruction to everyone, regardless of residence, economic status, or language. In unison with the Nordic principles of democracy, equal educational opportunity for everyone has represented a primary goal since the end of the 60's. Instruction is considered the key to international competition and national prosperity. It is also logical that in a country of poor natural resources, human resources are so highly considered. A further confirmation of this statement comes from Parliament, which, notwithstanding a period of recession, has ordered that no cuts be made to the educational budget but that in fact it should be increased. [Kyr95]

Thanks to this vision, a recent study, the OCSE (commonly called PISA) that took place between 1998 and 2000 and involved 32 countries, determined that the Finnish educational model was superior under every parameter of the survey, bringing the educational system of Finland into the center of international attention. The evaluation

domains included reading, mathematics, and sciences. The aim of the research project was to understand how youths applied their own abilities to resolve everyday problems and not to determine how well they knew the academic content of their school courses. The determining factors of the Finnish success are multiple and can be retraced to a good pedagogical model applied in the previous educational cycles, to the preparation of the faculty, the interests and the activities of the student population, the Finnish culture, but also to the influence of the cold, austere climate that does not allow much outdoor time. The results of the study, besides highlighting the merits of the Finnish system, also bring to the surface the parameters that can be improved. One point of consideration is that of an educational model of high quality offered equally to everyone that however yields results in correlation with gender. Males, in reading, obtain results noticeably lower than those of females, while in mathematics they demonstrate a functional competence higher than that of their female counterparts. This tendency is present, to at least some degree, in almost every country included in the study.

In regards to reading, Finland earned the highest score among the study's participants, much higher than the OCSE average. Information research and interpretation are the activities in which the Finnish students excelled; while their weakest points were reflection and evaluation.

The mathematical evaluation concerned algebra, functions, statistics, and geometry. Finland placed fourth in the world in this category, surpassed significantly only by Japan and marginally by the other Northern European countries. The Mediterranean countries, among which Italy, are those that yielded the lowest results. The Finnish students distinguished themselves; in particular, in their interpretation of graphs and diagrams, as well as in statistics, while in algebra their solutions often resulted incorrect.

The part of the study assessing science was very vast, and it included biology, chemistry, astronomy, ecology, technology, and genetics. The Finnish results were flattering. Only the Korean students obtained a greater percentage of correct answers. The Nordics distinguished themselves especially in the fields of ecology, knowledge of the human body, and technologies.

The high general culture can be attributed to the Finnish true passion for reading: three students out of four claim to read every day for the main purpose of information, reading especially newspapers, magazines, comic books, email, and hypertexts. Thanks also to the excellent network of libraries, Finland is first in terms of amount of books lent, despite the fact that the young Finnish do not show much appreciation for novels and classical literature in general.

The love of literature is completely personal and is not influenced, as in most other countries, by the family environment. Also, absent from schools is the negative pressure exercised by the teacher to read literature that does not reflect the interests of the student. According to researchers, the system of optional subjects and flexible curriculum played an important role in stimulating personal interest and love for literature in the Finnish students. [OECD02]

The flattering results obtained by Finland in the PISA should not, however, lead us to believe that the system affords no room for improvement, particularly when talking about recent arguments such as the didactic use of new technologies. As Ritva-Sini Merilampi, researcher for the Finnish Department of Education, points out, *"technology develops faster than man can understand how to use it effectively. Therefore, often, only a small part of its potential is reached. In the case of didactic technologies, we focus more on the technology than on the content. It is precisely in this passage from technology to content that we find the greatest challenge. In this sense, a less practical, but more theoretical attitude would help in choosing the right way towards innovation"*. An additionally significant observation comes from Outi Levaniemi, who has become the spokesman for many small Finnish schools, being himself the Principal of Vimpeli high school in a town of just 3500 people. Levaniemi says, *"I think that the Finnish school's biggest problem today is funds; currently the students that live in scarcely populated areas do not have the same possibilities as others that live in more rich, urban settings. Having to count greatly on distance-learning, we will need a program of special development; many schools need a broadband connection, that however is not expected any time soon...the key to our future lies in the cooperation between all the smaller schools, that together, can resound one single, strong voice"*.

4.3 Remarks on the Italian Educational System

The Italian system of secondary instruction and education, practically unchanged for eighty years, has stood up against numerous criticisms over the years but has been moved to change only since the Nineties. The dynamics of this change range from the perspective of autonomy to the reform of its cycles. Therefore, the debate has been open for some time but as it so often occurs in Italy, one of the crucial problems is the alternation of governments that have a different perspective on what the reform should look like; chronologically, the last proposal is that of the Minister Moratti that has been met with great criticism, especially from faculty members.

Among the most significant problems of the current system, that of the low productivity of the university system surely stands out: only a very small percentage of those enrolled is actually able to earn a degree; the duration of the undergraduate programs and their inherent difficulty creates a situation in which the average graduate ready to enter the work field is between 26 and 27 years old, an average much higher than that of the rest of Europe. Today the need for a reform has become increasingly urgent, especially when we consider the rising competition of the European and global market. The new degrees introduced in the last few years will hopefully help fill this void by introducing younger graduates into the work field. There remain, however, those that still long for the old system of degrees considered deeper and more complete.

Franco Filippazzi, computer science consultant for AICA, highlights among the problems of the Italian system the low selectivity of high schools, causing a flooding of the universities and a dropout rate of two thirds of the enrolled, not to mention the inadequacy of professional education that reflects the demands of the work field. In the case of the elementary and middle schools, the system's returns seem particularly low: there is a paradox in which a high number of teachers (the average teacher to student ratio is one of the highest in the world) coexists alongside a high level of scholastic dispersion. [Cal94] Top that with the fact that 97,8% of instructional expenses goes to faculty, the problem of personnel completely outweighing education is apparent.

This theme of educational renovation has been tackled in many meetings and seminars, reflecting a general interest for the problem. The recent conference Sirmi

2002, which presented a project, which would provide information technology in-servicing to all public employees, also brought to the table the limits of the Italian educational system. In particular, the distance between the world of university education and that of the work field was emphasized. To this effect, a point worthy of note is that of the incredibly low number of high school students, only 1.1% of the total, that participate in observation and student teaching experiences. If we add to the equation the reality that summer jobs are not a custom of Italian society, we realize just how traumatic the transition to the work field can be. Furthermore, young people from other European countries that fall in the same age group as their Italian counterparts, can boast resumes that put to shame those of even the most brilliant Italian students, who suffer from a severe lack of work experience. Schools should do more, as far as offering on-site company experience and helping those searching for summer jobs to find employment that coincides with their field of study.

The PISA study, presented in Rome in May of 2002, was primarily concerned with measuring student knowledge across the different countries. Approved by OCSE, this study provides the international data used to compare the outcome of instruction in 32 countries in the world. As far as instruction of students between the ages of 14 and 15 is concerned, Italy is part of a substantial trailing party, alongside Germany, Poland, Greece, Russia, and Brazil. In fact, we are in 20th place in the linguistics category and in 23rd place in the category of mathematics and sciences. The Minister of Instruction, University, and Research, Letizia Moratti, present at the event, attributes Italy's modest results to the prevalence of a culture based on procedures, processes, and economics, instead of a culture concerned with evaluation of results. It is necessary to pursue the transparency of those results to provide the results that were expected. Moratti believes, however, that schools have become aware of this need and that in order to raise the low Italian results as shown by the OCSE, the system must take example from that of Finland, which is based on greater flexibility of approach. For this reason the decree of the reform of school regulations hypothesized the establishment of a second option of professional education and the contextual possibility of *bridges* between different educational options. It was also suggested that schools provide a mandatory minimum of three hours outside

of curriculum hours, which students can make use of according to individual rhythms of acquisition.

Finally, emphasis was placed on the fact that a better preparation on the part of the faculty could be a determining factor in the resolution of the educational problem. During the course of the function, it was also observed that the best results come from places that dispose of greater financial autonomy, where institutions are freer to invest their funds autonomously. In reference to this, the Minister restated the importance of the recent autonomous dimension of our schools, adding that the law should be reinforced and actuated in its entirety, defining in a more precise way, objectives and national standards. Research projects have tried to give reason to the Italian response: as far as mathematics is concerned, for example, students have difficulty applying scientific knowledge to concrete situations and they demonstrate awkwardness in expressing and sustaining their personal opinion using procedure and scientific concepts. The best answers are given on superficial-knowledge questionnaires, while the worst results are yielded when more complex competency is required. The reasons for this failure bring to light a few limits of the Italian school in the field of sciences, limits which often resurface in other disciplines. First of all, the insufficient presence of experimental science in the curriculum, as compared to that of other countries, is still too much of a superficial view of the sciences; not enough time is dedicated to personal discovery and even less time to reflection on the limits of the scientific method and its utilization in understanding technology and everyday problems. In addition, only recently has the problem of faculty preparation been addressed; faculty education has been so far almost exclusively theoretical and often disassociated from the empirical laboratory experience. [May02]

4.4 Compared Analysis of Questionnaire Results

After having analyzed the individual situations of Finland and Italy concerning the use of didactic technology, the individual results were compared, despite the fact that the difference in the two school systems did not allow a comparison of every parameter. Even when faced with the same question, the answer provided by the schools was greatly influenced by the cultural background which the schools made reference to. It is also

interesting to note how the Italian institutions often chose not to respond to questions considered not pertinent to the survey or too personal, like those related to the age of the computer science teacher. On the other hand, some schools chose to offer long explanations concerning other questions, like those addressing laboratory policies. Conversely, the Finnish schools answered with great honesty, although some answers were so brief and schematic that they seemed almost cryptic. Despite the differences encountered, we believe we can consider this comparison quite faithful.

A first factor to consider is that of the average size of the schools that answered the questionnaire; this average reflects the difference in population density of the two countries: 400 students per school in Finland compared to 623 in Italy. The average number of faculty is also higher in Italy, 76 to 34. However, this trend presents a few contradictions when we look at the number of lab technicians responsible for computer science labs. While no Finnish school is without a lab technician, in Italy, a hefty 13% of the surveyed institutions has no such position. In any case, in both countries the most common situation is that of a single technician per school.

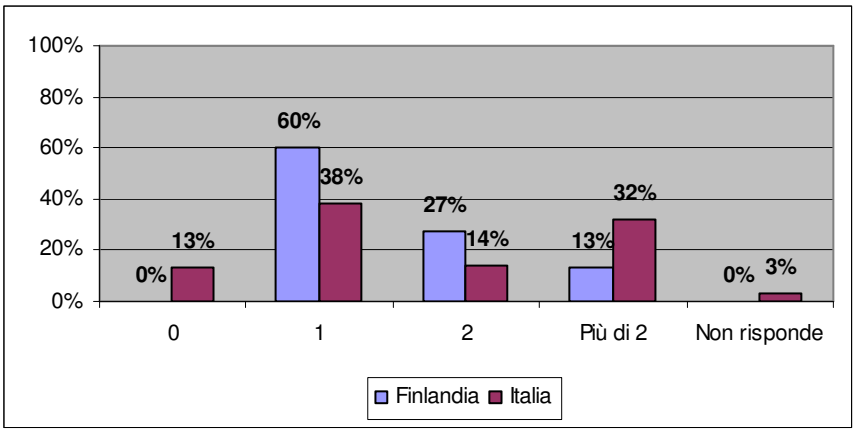


Fig.4.1: number of technicians per school

Studying the Italian situation, it was imagined that one of the obstacles to introducing new didactic technology would be the older age of most faculty, in particular the faculty of computer science, which would have resulted in a difficult adjustment to new methods of teaching. We find full confirmation of this notion when we compare the Finnish situation, in which 39% of the computer science teachers are under thirty years of age. This is, however, a partial comparison in that 43% of Italian faculty refused to answer this question regarding age. We can safely presume that faculty in this percentile

are older, and by responding would have tipped this comparison even further in favor of their Finnish counterparts.

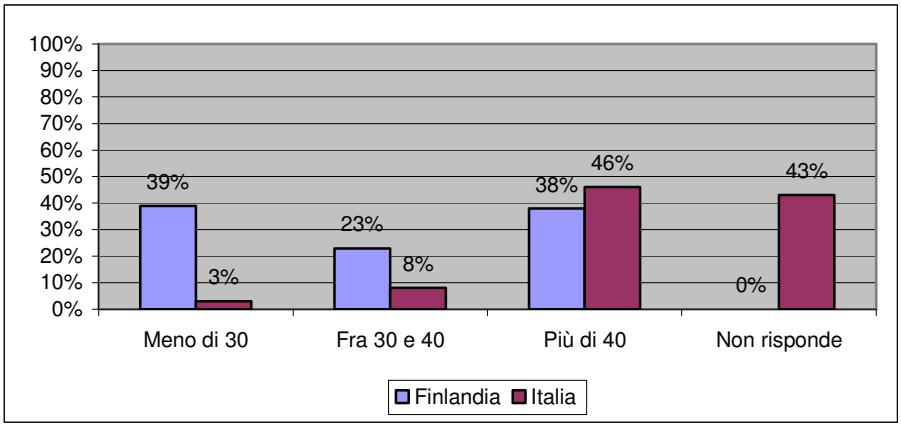


Fig. 4.2: age of computer science faculty

We will now pass to an analysis of the gender of faculty responsible for new school technology: results are similar for both countries, both presenting a prevalence of male teachers.

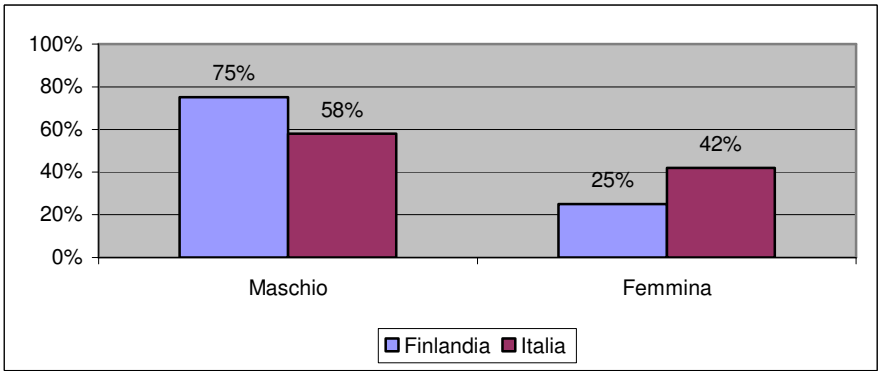


Fig.4.3: classification of computer science faculty by gender

A comparison between genders was also made on the level of the participation and profit of student enrolled in computer science classes. This was not an attempt at proving that males are simply "more apt" to the use of computers than females; the purpose was to understand if indeed there exist differences between the sexes, and if so, how these differences could be smoothed out in an effort to guarantee equal opportunities in the work field, where so often those with better computer skills are easily hired. The Italian schools maintained that participation and return were equal for both sexes, and in rare cases some schools actually answered, with clear annoyance, "*of course*

participation and results are the same for both sexes"; many others (24%) preferred to not answer.

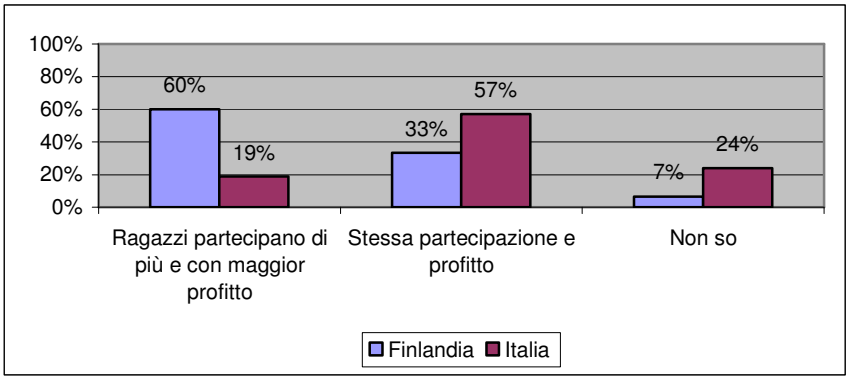


Fig.4.4: participation and scholastic merit according to gender

Conversely, the comparison with Finnish, voted in a 2002 survey as the most sincere and honest population of the Earth, revealed that 60% of their questionnaire answers sustained a greater participation and profit from males over females. This statistic is even more solidly confirmed when we compare it to the percentage of male computer science teachers, which has the upper hand in both countries: these differences would not have been as noticeable if the female students had been, on the whole, more interested in the subject. Now, the comparison shifts to the technological infrastructures, where the most important figure is that of the number of students per online computer. With the European objective of one computer for every five students in mind, it is safe to say that Finland is much closer to meeting this objective than Italy, where 73% of schools can provide only one computer for ten or more students. Italy also takes an agonizing first place by having within 10% of its schools a computer to student ratio of over one to one hundred.

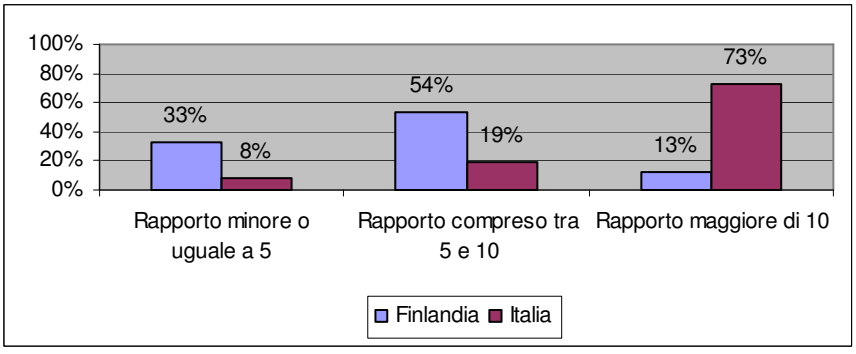


Fig.4.5: number of students per computer

A comparison between other computer science materials shows that, for the most part, both countries have computer labs equipped to the same degree, with printers, scanners, and CD burners.

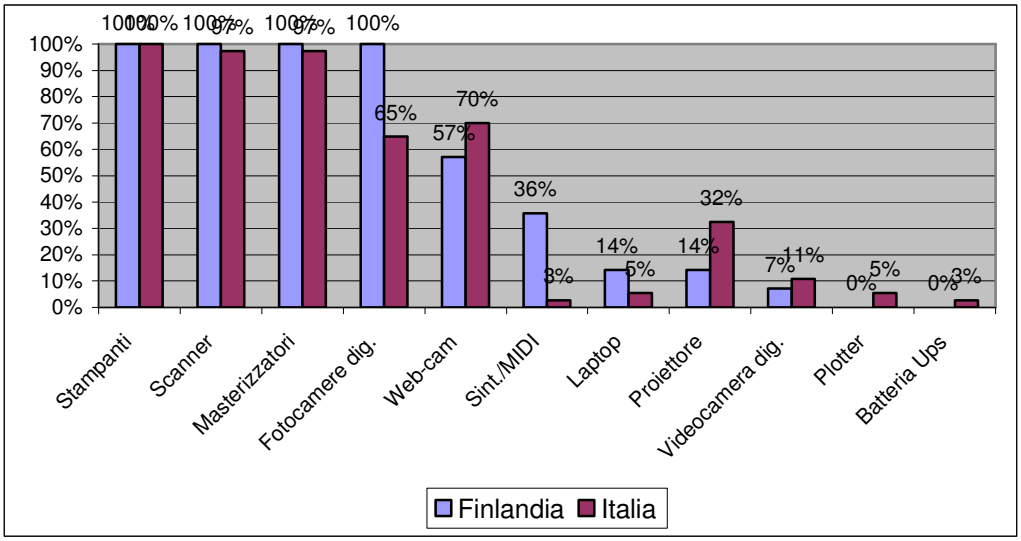


Fig.4.6: computer science equipment available

We also see consistency between Italy and Finland in operating systems installed. Windows is predominant from every perspective. The country of origin of the Linux operating system expected a usage of over 21%, but as some teachers explain, using Linux is not simple or intuitive. Furthermore, Linux cannot boast the gamma of software applications that the Microsoft operating system can. Windows ME, the operating system with the least turnover in Finland, is, second only to Windows 98, the most used in Italian schools. Macintosh systems, although excellent for multimedia use, are not popular in either country, which confirms the idea of limited creativity within schools.

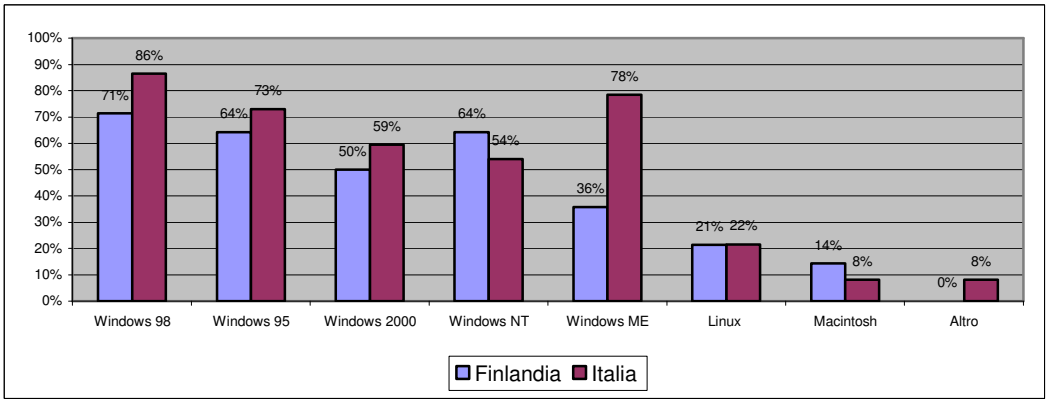


Fig.4.7: operating systems used in schools

One of Italy's strong points concerns their Internet connection, which is present in all institutions, via either ISDN (38%) or ADSL (54%). Europe is aiming at a high-speed, global connection, which would cut the connection costs; in this area, Italy proved to be ahead of the game. The Finnish situation is pretty good: all schools are connected and half of them through a broadband connection. However, a percentage of Finnish schools that cannot be overlooked (14%) has an Internet connection via modem.

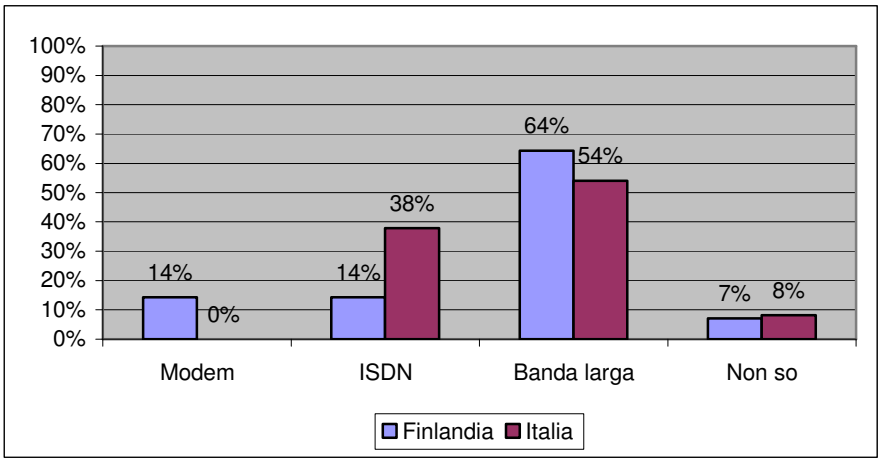


Fig.4.8: Internet connection mediums

Although there is always room for improvement, it is safe to say that, for the most part, the technological infrastructures are quite adequate. It is a popular opinion, however, that they must be well integrated with the courses of study; there have been many disputes as to the didactic worth of technological instruments, the main question being, "studying computer science or studying *with* computer science". Nowadays, we consider useful the teaching of computer science as a subject, therefore teaching all its related concepts, like the language of computer programming, structural data, etc. Likewise, the use of technological instruments to improve the acquisition of other subjects and to develop interdisciplinary projects is equally valuable. In the Nordic countries the tendency has been to use computers as resources in all subjects, while in Italy the first applications of computers were solely in the context of computer science, and subsequently in some of the scientific disciplines. Only after the advent of multimedia computers and of Internet did this tendency change and now we find an ever-growing use of technology (38%) in all subjects.

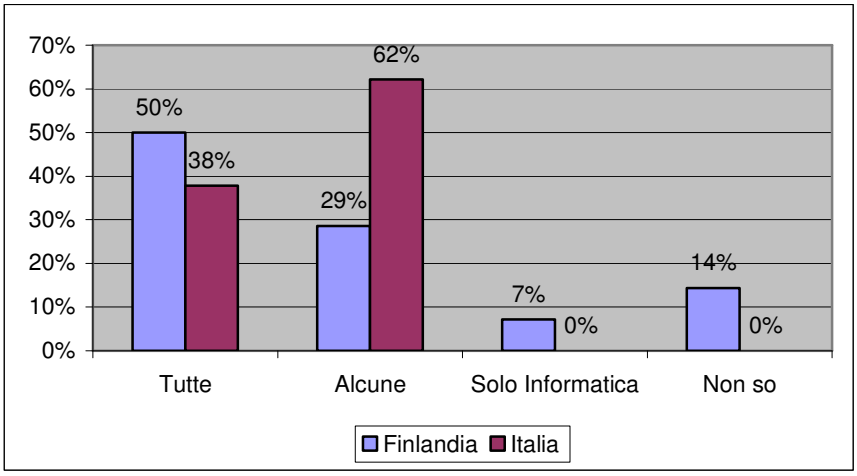


Fig.4.9: ICT inclusion in the teaching methods

Mathematics, Physics, and Languages are the disciplines that most frequently benefit from computer technology support, both in Finland and in Italy. There are several reasons: one of these is certainly the availability of valid scientific and linguistic software. In fact, many schools have reported the use of Derive, Cabrie, and Livemath in the field of mathematics; in addition, more and more programs are released that guide the student through the acquisition of a foreign language, that perfect pronunciation, and that offer exercises of gradually increasing difficulty. Furthermore, in Italy, the teaching of mathematics and physics with computer support was facilitated by the fact that the very teachers in these areas of discipline were responsible for introducing the new technology into the teaching method.

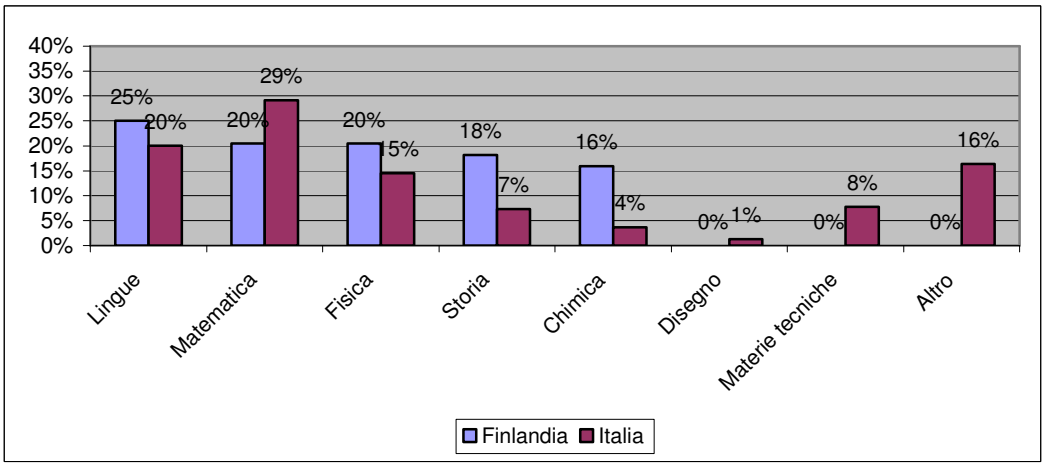


Fig.4.10: disciplines which incorporate the use of ICTs

The didactic applications of the new technologies are numerous, even though only a few have rapidly gained popularity within the schools. Word processing is by far the most popular use both in Finland (43%) and Italy (47%), but the number of classes that use the Internet for research purposes is on the rise (29% of Finnish schools and 34% of Italian schools). There are also applications which change according to the country in which they are used: in particular, many Italian teachers (31%) have reported teaching computer programming, while many Finnish colleagues (43%) use computers primarily as assessment tools and group work instruments. As was assessed in the Didamatica 2000 conference, Italy has always been more oriented to "Information Technology" rather than to "Information and Communication Technology"; the use of Internet as a research resource was discovered much too late, therefore it is now considered especially as a great research engine rather than an instrument of communication. In class, the creation of multimedia and hypertext projects and the elaboration of research projects and essays are complemented by the collaboration of the students, responsible for production, with the teachers, who provide topics and arguments. In Finland, on the other hand, since the Nineties, there has been a constant dialogue with the outside world, and language exchanges and computers prove to be the most natural means of communication.

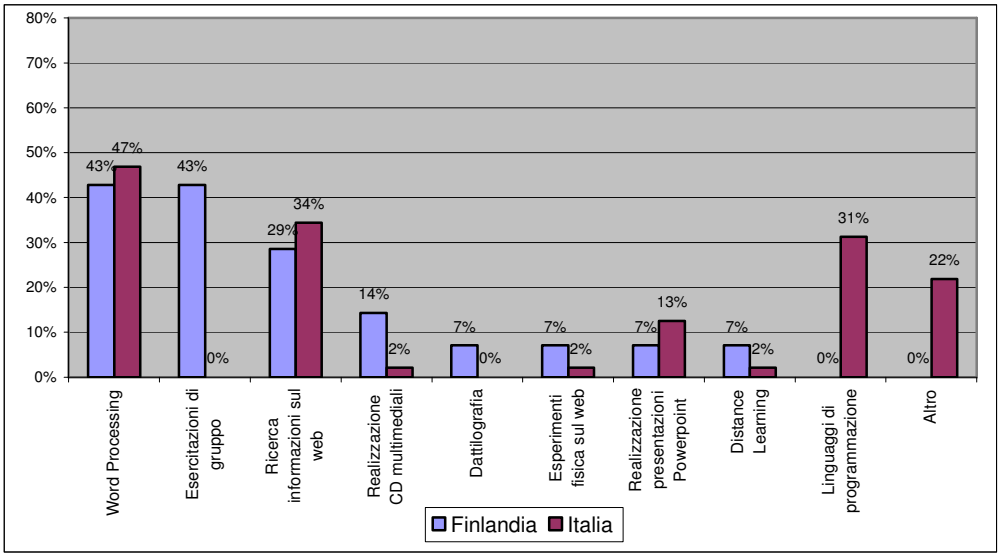


Fig.4.11: use of ICTs throughout discipline areas

Because of the European scope of the ECDL project, the number of institutions in which it was possible for the students to take the European computer license test was also compared. The results of this comparison confirmed that which the Finnish and Italian

superintendents of the project sustained: in other words, Finland is still very far behind, while Italy is one of the leading countries in the furthering of the ECDL project.

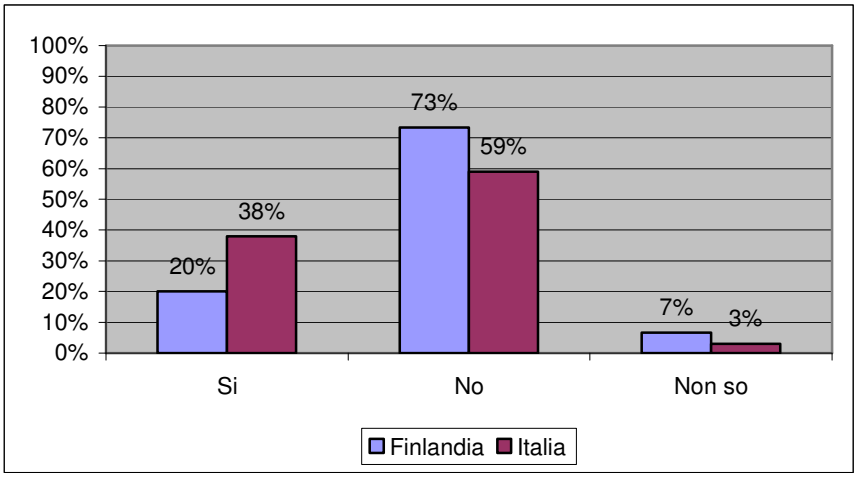


Fig.4.12: school offering the ECDL exam

Having to update the contents of the computer science courses and the competences given by the ECDL being standard, it came natural to apply the concepts of the ECDL modules to the scholastic sphere. That way, every student will be able to, through academic preparation, acquire the necessary knowledge to pass the exams and earn the license. As of now, 38% of Italian schools (same percentage of test-centers) and 20% of the Finnish ones utilize this method but it is sure that in the near future more schools will add to these figures.

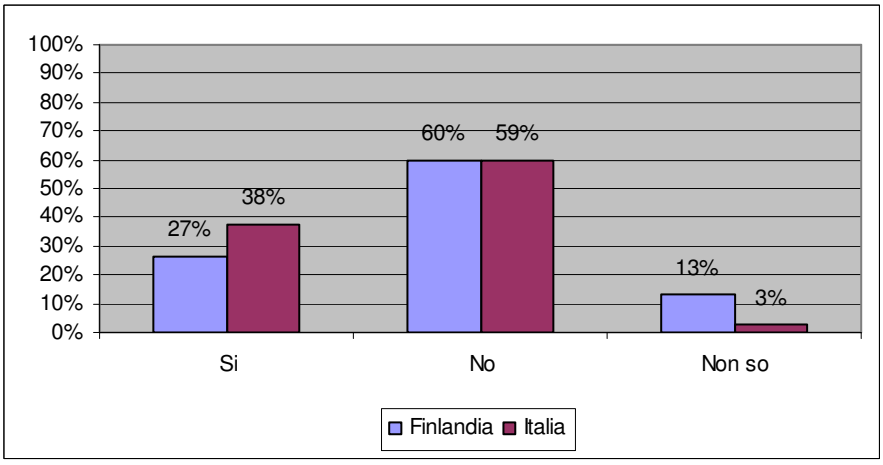


Fig.4.13: concordance of computer science classes with the ECDL modules

Besides including computer science in the courses of study, every year many projects are created with the use of new technologies. Nowadays almost all schools have

a web site, which usually contains information as to the history of the school, the courses of study offered, as well as section designated to the faculty and student life, this last being updated by the students themselves. 78% of Italian schools and 73% of Finnish schools are found online, but unfortunately, after analyzing a sample of these sites, it was determined that many of the Italian sites were simply a source of general information of little worth, in which the students has no active role. If this comparison is compared to the percentage of institutions in which students have a personal web page, we understand that in Italy not much initiative is given to those who should represent the heart and soul of the institution. Several considerations should be made concerning the school paper, which is a traditional characteristic of both countries. For example, in Italian schools it is created especially by the graduating classes, which utilize the profits of newspaper sales to finance their last, big field trip. In this kind of circumstance, students demonstrate creativity, originality, and the spirit of initiative, as well as skillfully putting computer and multimedia equipment to use. Teachers, on the other hand, love to use computers to further the acquisition of foreign languages: in many Italian institutes (62%) it is common practice to designate one hour a week to writing emails to correspondents in a foreign school, while in Finland (47%), where linguistic familiarity is greater, many systems of synchronous communication, like videoconferences, are put to use.

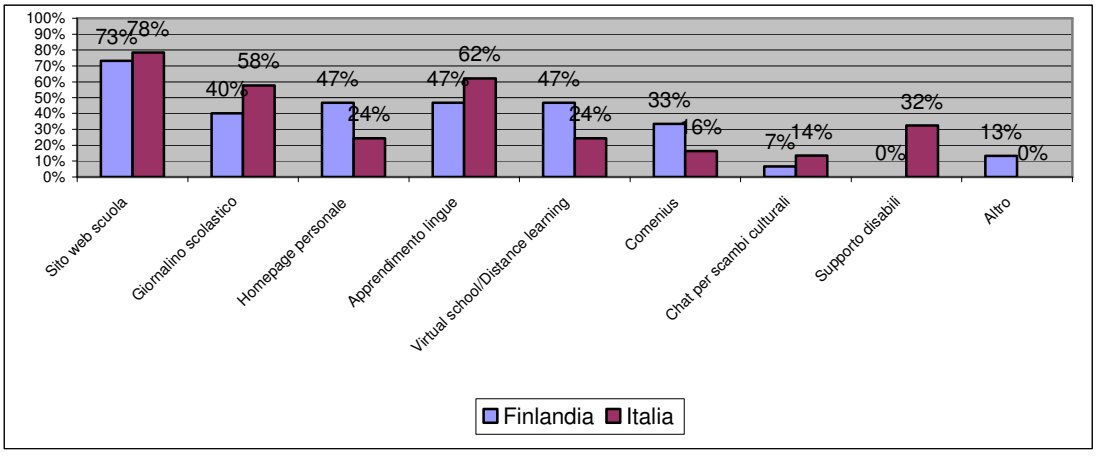


Fig.4.14: school projects and new technologies

As far as participation in the European project Comenius is concerned, Finland is participating with a good number of schools (33%), while only 16% of Italian schools has taken part. A teacher from Helsinki who had planned to participate in the Comenius

project with her classes, one Italian and the other German, had a rather negative experience to relate: *"Our documentation and that of the Germans was detailed and ready; the Italian documentation, besides being presented after the established deadline, was not complete in many areas and imprecise in others. Consequently, our project was not accepted. In the future, I will think twice before accepting an Italian school as a partner in another project"*.

Worthy of note is the complete absence of Finnish projects designed for the disabled, in which computer support should have compensated for those limits inherent to the handicap. Italy, however, revealed to be very sensitive in this field, with 32% of its schools having developed projects in which students with mental or physical handicaps took active part.

Oftentimes the desire alone to carry out a project is not enough: without financial means there can be no fulfillment. The majority of Italian (34%) and Finnish (32%) have to rely on the institution's private funds, which evaluate, according to availability and the validity of the project itself, the extent of the financing.

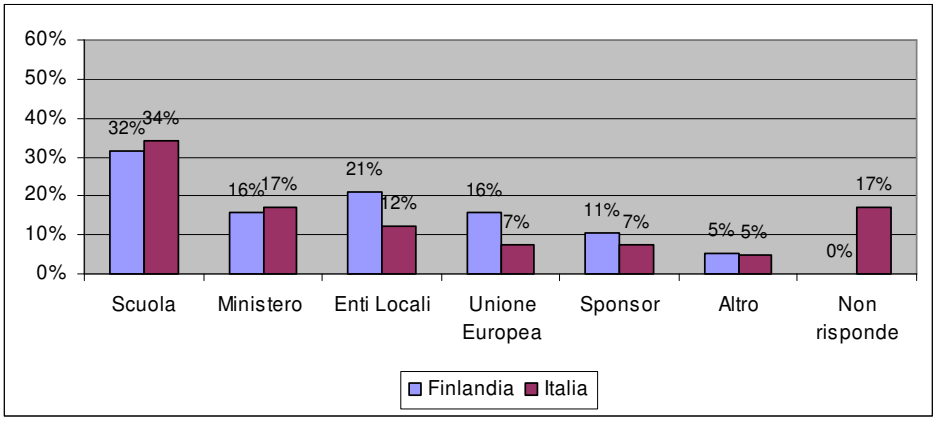


Fig.4.15: sources of financing for school projects which include new technologies

According to a teacher from the Marche, *"funds are limited and, when they are available, they are poorly spent. Many instructors do not understand the value of certain projects, in particular those of collaboration with other European institutes that require the use of communication mediums, like computers, and therefore they block their approval. Until there is a majority of teachers open to new technologies, many of the best and most innovative ideas will not be able to be fulfilled*". The State, through the Ministry of Education, finances an established number of projects each year (16-17% in

Finland and Italy); if more funds were earmarked, it would not be necessary to begin the institution's bureaucratic process, but unfortunately, at least in Italy, the trend seems to be that of cutting the already too high expenses for education. European financing, while substantial, is not easily accessible, and being backed up by an economic sponsor is still not common. According to the eEurope project, collaboration between the public and private sectors will increase, benefiting the financial situation. For right now, economic problems remain one of the greatest obstacles to the realization of projects that require the use of new technologies.

4.5 A European School Model

Year after year, there has been a growing integration between the member States of the European Union. After economic consolidation in Europe, we wonder whether or not we will witness an educational consolidation as well. In particular, after analyzing the current situations of two countries so unlike each other as Finland and Italy, which are, nevertheless, European countries, and after comparing the pros and cons of the two educational systems, it seems necessary to attempt a delineation of a model European school, the "European Unified High School." The proposal presented comes from the very results of the questionnaire and from observations during school visits; the proposal attempts to interpret the opinion of researchers, Principals, teachers, and students who are interviewed. Every aspect of the school system will have an important role: the EU will study a unified educational system, that will, however, preserve the local identity; the teachers, who will put into practice the guidelines, will have to prove to be the strongest believers in the program, laying the groundwork for an even more united Europe. The students, as beneficiaries of knowledge and future European citizens, will have to take on an active role in the school. This role would include participating in projects, proposing initiatives, and overcoming the rivalries with the rest of the academic world. The role assumed by the students would be invested with the awareness of being able to acquire a mentality more important to dialogue and desirous of going beyond the boundaries of the individual's country, on both a physical and cognitive level. This idea is not a novelty, in that a European School already exists (www.eursc.org) and is recognized by the EU, with

twelve schools in seven different countries and 16000 students enrolled. The European School, which for years has been proof that a multicultural and multilingual school is not just a utopia, should, however, be strengthened and spread throughout the rest of the member States.

The European Unified High School would be none other than an evolved European School. This model is open to contributions of both a cultural and a scholastic nature from the country in which the school would be found; the contributions would surely be enriched by the dialectic relationship between school and state. For example, Italian schools, infrastructures aside, would greatly benefit from some good, old Nordic pragmatism, while Finnish schools really must learn from the Italian way that history is life's greatest teacher. As Prof. Savelli, a physics teacher at Castelnuovo High school of Florence (a high school specializing in science), highlights, "*Italy has no rivals when it comes to laying a theoretical foundation, both on the analytical and synthetic levels. This foundation contributes to the development of a deep critical disposition*."

If the complete unification of the educational systems seems an unattainable goal that would not, in any case, be without negative consequences, perhaps the proposal made by a Finnish teacher, Erno Kivela, seems more adequate. "*The European nations are too diverse to have common curriculums. The best choice would be to keep the focus of secondary education on the local realities, establishing, nevertheless, standard objectives to be met. Then, on the basis of these objectives, students would have to take a standardized test for all of Europe, which would have a standard evaluation process and which would allow access to higher education and the working world*." Even according to Prof. Giovanni Ragno, of the ITIS Belluzzi High School, the idea of unifying attainable objectives, while continuing down different educational paths, seems for sure the most realizable goal.

4.5.1 the role of the Government

The European Union, through the global program eEurope, has proposed a series of guidelines for all sectors in which technological innovation will take place. The local governments, through their own departments, have the responsibility of implementing

these proposals. Therefore, the push for innovation must come from the State and must include a precise layout of national strategies. However, major changes don't happen overnight: it will take time to see concrete results, but that should not discourage any part from working towards renovation. First of all, the guidelines presented assert the need for each government to set in motion a reform of the educational system, if necessary, to prepare its citizens for the new values of the information era; this reform must take place before any unified program can be initiated.

4.5.1.1 a computer for each student

The first great challenge is surely related to the creation of technological infrastructures: computers with Internet connections available to all. Already much has been done, but an even greater effort is needed to provide all schools with an average of one computer for every five students. In Italy, the average ascertained from the questionnaire is certainly not encouraging (29,44), while in Finland the number of students per computer is excellent (8,48).

The European Unified High School model calls for a computer for each student, provided by the school with the same hardware/software configuration for everyone, as well as a high speed Internet connection. The software should not be commercial, but of the "Open Source" type; in other words, the programming codes should be available to be studied, improved, and made available to everyone. As far as operating systems are concerned, the Open Source software par excellence is Linux. Seeing as faculty knowledge of Linux is so limited, there would definitely be the need for a faculty update: several ECDL modules that address this problem are already ready and could be an option for those who have a decent level of computer science knowledge. In regards to the type of computer that would be adopted, it would be advisable that they be laptops; laptop computer would easily be integrated into every activity of student life. The computer as a medium should become an instrument of everyday use for the students, to the same degree of books. The computer, during the duration of the school semester, would be school property and would be lent out to the student to use in his or her studies. At the end of the school semester, the student would be able to keep the computer by

paying a certain amount of money, which would be in proportion to his or her grades, directly to the school. This system would stimulate higher achievement in the students, automatically renew the school computers, and lower the costs of computer technicians.

The hardest part in realizing this model is the cost, which would be very high: it would have to be sustained by the government and companies, but at the basis would have to be a radical change in mentality. It would no longer be the student paying to study, but the State rewarding the student for superior achievement. We are convinced that a model of this nature, that gives all students, regardless of economic status, the same possibilities, would stimulate students to do their best. In the transition period in which we would try to reduce the computer to student ratio, each student would receive a personal account on the school server. This system is already present in a few schools, but with heavy limitations. Every student should have a personal email address with a capacity of several hundred megabytes, as well as a fixed number of printer copies each month. The system should not change from school to school; a national plan of action should be enforced, which all schools would conform to.

A situation as the one described thus far might become a reality in several years or might never become a reality, however, it is sure that only with great investments and collaboration on everyone's part will there ever be a true innovation in the educational field.

4.5.1.2 supporting the digital culture

A frequently recurring situation in schools is that of having the means but not the knowledge to utilize those means to achieve didactic objectives. Computers, like in the past with VCRs and TVs, are oftentimes an inconvenience in the scholastic environment because they can be considered a distraction rather than a learning tool. Therefore, it is necessary that a digital cultural, at all levels, be propagated. Among the different proposals made, that concerning the inclusion of an annual project alongside another European school should be considered. Every class would have the possibility of

comparing itself with other realities, while at the same time practicing communication with linguistic and technological tools.

A few students from foreign universities, on a one year exchange program with the University of Bologna, deliver a heavy accusation towards Italian students: "*It seems that Italian students, before getting to college, are nuzzled in their home life and their local scene. They are only concerned with what happens within their school or at the most within their city. They know little to nothing about the other European countries and their perspective is often limited to that which they see on television. They travel mainly because it is 'the thing to do' and rarely do they speak a language other than Italian. When they do enter into the University world, immediately a new world opens up before them and they realize the responsibilities they have to own up to. But perhaps by then it is too late*." This criticism, although a bit excessive, shines light on a few aspects to reflect upon: the gap between the high school reality and that of college, the necessity of knowing more than one language, and the necessity of developing a critical ability for the comparison and the acceptance of other cultures. From these premises, a proposal for a European project, which would mobilize the student population at a high school level, emerged. While in several European countries, in particular the Nordic countries, the idea of spending a semester or a year in another country is quite commonplace, in Italy and the other Mediterranean countries it is much less. The project should be reserved to high school juniors and seniors and should take into account their young age by providing additional services compared to the current mobilization programs. In particular, room and board similar to that found on American campuses should be guaranteed in an effort to provide an international environment. Stimulated by this new experience, students would come into contact with different languages and cultures, and they would be faced with practical, everyday situations, which they would never experience back home. This new learning environment would stimulate qualities like problem solving skills, even though knowledge acquisition within the classroom would constitute only a small part of the entire experience.

Parallel to the mobilization of European high school students, a second mobilization should take place, that of the faculty, in particular the first-year teachers and those teachers who do not have urgent ties to their country of origin, like family. The

teacher would have the possibility of learning common foreign practices, in order to then bring them back to the native country. Furthermore, a European policy of balanced professions could be established: young teachers who would otherwise be stuck as substitute teachers for years in their own country, could be sent to countries with a teacher shortage. For example, in Finland there is a great need for teachers of mathematics and physics, especially in the Mid-North. In Italy, on the other hand, there are many teachers who have been waiting for a position for years…in this case, a European opening would give a hand at solving these occupational problems.

A second path to follow is surely that of offering incentives to all organizations and associations who actively participate in the educational field, as seen in the example of Maailma Tutuksi in Finland. Their responsibility would be to study and propose valid projects for schools, and provide didactic material, in different format, including digital. In addition, other institutions could worry about maintaining the school network and facilitating new contacts and exchanges. This way the schools would find predisposed "packets" and the local governments would not have to use different companies every time, but could count on one consolidated group. In the upcoming era of digital television and the dawning of the traditional era of lower quality programs (lower quality because lacking educational or didactic purpose), channels could be reserved for audiovisual material produced by the associations and the schools themselves.

4.5.2 the role of teachers

The teacher image, fundamental in the process of learning, is now in its greatest crisis: besides being poorly compensated, teachers are subject to contradicting demands. On one side, we want that the methods of cooperation and inclusion of students in difficulty be favored. On the other side, however, we want the teacher to bring the class as a whole to a higher standard based on a system in which all students are required to do the same things in the same amount of time, and if the pace is lowered by slower students, it is inevitable that the class average will proportionally decrease. The same contradictory situation arises with the introduction of new technologies: on one hand we have the rigid, traditional system of lectures, strict adherence to the program,

interrogations, homework, and on the other we have innovative, multidisciplinary and group initiatives, which would, however, take precious time and energy from the curriculum coverage and the cycle of interrogations. For the most part, the faculty makes a choice (oftentimes forced) to follow tradition, stifling any possibility of innovation. As Calvani points out, "*The more serious teachers today are in a state of oppressing frustration; they are caught in the cross fire between outside criticisms and the anxiety of keeping their jobs.*" [Cal94]

One way of overcoming this crisis is suggested by the Finnish: a non-confrontational relationship between the faculty and the school environment has an excellent effect on instruction. To be able to work without extraordinary pressures, as is usually the case in Italian schools, leads to great enthusiasm, which is in turn transmitted to the students who can then perform to the highest of their abilities. To reach this ideal state, there must be an informal atmosphere in school, between both faculty and staff and between students and faculty, without blurring the boundaries between these roles. Also, it is equally important that faculty concentrates solely on teaching and building relationships with the students; teachers should not be burdened with daily bureaucratic tasks. Bureaucratic responsibilities, besides requiring many extracurricular hours on the teacher's part, can cause teachers to actually fall into a state of depression and frustration, which in turn negatively influences their teaching.

If teachers could work free from pressure and if they had the necessary time for in-servicing, a greater percentage of teachers would dedicate themselves to thoroughly learning how to use new technologies. A deeper computer-science culture would bring to the table numerous innovative ideas concerning the utilization of technological tools in various fields of study.

Another important factor in the equation is that of teacher age. It has been verified through correlated analysis of the Finnish and the Italian situation that having a higher average of younger teachers increases the use of technology and facilitates different methods of instruction. However, it is obviously impossible to force teachers to follow a certain teaching method or style which they do not identify with or with which they have not had much experience. If innovation is truly the goal, it is not sufficient to provide schools with infrastructures and prepare advanced development strategies;

schools must have the courage and determination to gradually update the faculty, and as Franco Filippazzi maintains, "successful carriers should be based on professional merit, rather than on seniority!"

In Italy, it is also the norm for professors to be very tied to the assigned curriculum and to its completion, using primarily the traditional lecture teaching method. Beside the responsibility of completing the curriculum, teachers must also evaluate each student through oral interviews and written tests. This teaching model creates a situation to this effect: the instructor carries out his or her job with no connection to the students whose job it is to earn a passing grade whichever way they can. The students see the instructor as an antagonist rather than a mediator and imparter of knowledge, competence and skills. This model does not allow these two parts to focus on the true process of acquisition, which would call for collaboration between teacher and student to complete the curriculum. In turn, the curriculum should proceed only when knowledge is truly acquired; if this were the case, even evaluation would become a simple formality!

In conclusion, adopting the European model requires a radical reform, ranging from the student/teacher relationship and the teaching method, to evaluation and the personalization of curriculum content in an effort to engage all students to the highest potential. In the countries of Northern Europe, all national strategies for technological innovation are based on the development of capabilities such as lifelong learning and problem solving. In Italy, this approach is just now coming to light.

4.5.3 the role of students

The students of the European Unified High School would have to play an active part in the school itself, and not assume the role of the current system, which is that of passive receptors of instruction. However, in most cases, many restrictions and few responsibilities are imposed on the students, essentially because of a lack of trust. If, on the other hand, students demonstrated maturity and responsibility, they would be guaranteed unrestricted and prolonged access to the use of scholastic tools, in particular technological tools, for the development of their ideas. To reach this level of

trustworthiness, there needs to be education and example on the part of the family and the entire school, from the janitor to the Principal.

Once the necessary means have been provided, creativity, something that is so often overlooked in today's schools, should be stimulated. Activities such as that of the school newspaper are great, but they should be coupled with others such as recital and singing, as well as other more "technological" activities, like running a school radio program or creating a short film. We often tend to consider these ideas as unfeasible because of means or space, but today, thanks to technology, it is possible to create semi-professional projects at low-cost. Seeing as cinematography or recital courses are expensive and not everyone has the possibility of experiencing a major radio station, participating in initiatives such as the Finnish "Communications Camp" becomes important. These kinds of projects should not remain simply an interesting experience for the student, but should also be an integrating part of high-school learning. Furthermore, these projects have as incentives scholastic credits and should be funded through the cooperation between the private and the public sector, as suggested by the eEurope 2002-2005 strategy.

Initiatives like "Communication Camp" should not focus on a single nationality, but should call into play different social, cultural, and linguistic experiences. This way, high-school students would be already introduced into very stimulating international atmosphere, which would begin to shape their awareness as European citizens. Therefore, as there is a Socrates/Erasmus program (cultural exchange program) for University students, more value should also be placed on the Comenius program for high school students.

4.5.4 enactment of the model

4.5.4.1 introduction

Let's imagine an overview of a European Unified High School, on the basis of experiences gained in this research. The point of view would certainly be directed toward the presence and the use of new technologies, but in our hypothetical case, administrative and organizational aspects will not be dealt with, although these factors alone should not

determine unfeasibility. For now, we will limit ourselves to asking the question, "If this were a reality, what could you possibly object to?"

4.5.4.2 a day-in-the-life of a European Unified High School

Entering a European Unified High School, you are immediately greeted by the Principal, who would be responsible for guiding visitors through the school, illustrating the instruction programs and the educational tools. It is instantly apparent how technology is an integral part of the institute: on every wall you can find Internet ports and in the hallways there would be Internet points in which students could check email and conduct bibliographical research. When first accessing one of the terminals, one is immediately asked for a user name and password. The Principal informs the visitors that access to the terminal is regulated by individual computer profiles, and one is typed in, in order to take a look at the installed programs. One can browse Internet, open, modify, and print a document using one of the numerous network printers, or access the school database, which contains both text and multimedia documents. The computer is very fast and the Internet connection is able to open presentations and video clips in full-screen in no time. After disconnecting from the system, all temporary files are automatically eliminated and the computer is ready for the next use.

The visit to the European Unified High School continues and you head to the main office. Here staff works briskly, communicating via one of the school's two LANs reserved to the administration staff. Unfortunately, as it often happens, one of the computers freezes while writing an important document. One of the technicians is called, who analyzes the problem and tries to solve it. The role of the technicians within the school is very important: this is apparent once you visit the computer lab. The Principal points out also the school calendar, which includes lessons from Monday to Friday, both in the morning and in the afternoon, totaling 180 days of school. Among the curriculum of instruction, there are of course a certain number of "traditional" subjects, recurrent in all European schools, and other more "local" subjects, which address the country in which the instruction takes place. These subjects are taught in the morning, from 8:30 to 1:30 p.m., while interdisciplinary subjects, seminars, and projects take place in the

afternoon. The entire school staff has the possibility to eat in the school cafeteria; work starts back up in the early afternoon, at 2:30 p.m. As you continue to talk about school hours, the fact that the computer lab remains open all week, 24 hours a day for whoever might need it, is underlined.

As to inquiries about security, the Principal responds that a personal magnetic key, which identifies and logs the user, complemented by a closed circuit surveillance system, allows access. In addition, a file-logging system, with personal accounts, would effectively identify possible illicit users.

Finally, you are in a classroom, where an English lesson is being taught. The Italian professor is aided by a young, graduate, mother tongue, who acts as a tutor. You witness the explanation of a few grammatical structures, an explanation that follows the traditional teaching methods. At the end of the period, the instructor explains that every week there are quizzes taken on computers; with every quiz, the progress of each student is kept in a virtual area called an "online grade book," which can compute a variety of statistics, for both individuals and entire classes. Every teacher has a personal online grade book, as well as a physical grade book, to make the most of. When asking whether two grade-books were needed and why not utilize simply the traditional one, teachers answer that their full use is complementary, and both offer advantages in the specific area of application. The physical grade-book is immediate and has predominately a scholastic use. The online one has to be systematically updated during planning periods and at home, and it is used primarily at evaluation time of the student and the class in general. Furthermore, the virtual setting allows teachers to put at the disposal of the class useful documents and materials, as well as opening a forum of discussion and creating an archive of completed projects, in accordance to the units covered by the teacher.

You visit a second classroom, where a science lesson is being taught by a genetics expert, connected via videoconference and viewable to all thanks to a video projector, making questions and discussion possible. The topic is human cloning. One student is presenting his or her point of view to the class, utilizing overhead transparencies on the computer projector to sustain his or her argument. The instructor, in this case, acts as a discussion moderator between the different sides of the arguments. The atmosphere is one of interest in the topic: many students would like to intervene, and the presence of an

expert is a greater stimulus to do so. At the conclusion of the discussion, if you would like further information concerning this system, the instructor would at the beginning of the next school semester, because of the success of the initiative, the school will be able to access links to digital content made available by the Ministry of Education. This material would be pertinent to the topics being addressed. Also, the Ministry would organize the participation of people who would participate to the discussion, either physically or virtually, once contacted at an address of their choice.

At school assemblies, every class chooses, at the most, three annual events, which the school makes possible. The dates are established according to the availability of the experts, providing, of course, adequate further notice. Among the list of experts are sports champions, entertainment celebrities, writers, philosophers, researchers, and so forth. The event would also be digitally recorded for future viewing. The students, when asked whether or not they like this system, declare to be enthusiastic about it and look forward to the next event.

The videoconference system is really put to use within the school: students that are sick, or those with physical disabilities, can follow the lessons from their own home, with the permission of the Principal. Particular focus is on the physically impaired, who have a specifically designed computer, with software configured according to the disability, as well as an assisting teacher, who follows them through their education. The disabled participate in activities with the others, using methods which bring them closest possible to the capabilities of their non-disabled friends, in order to reduce exclusion to a minimum. Everyone is equal in the classroom, even with physical, social, religious, and linguistic differences. Also, the school encourages the presence of foreign students on yearly exchange programs. In some classrooms, their presence amounts to 40-50% of the total. Much discussion has been conducted as to which should be the official language, and in the end the decision was made that it would be Italian for classes that have at least 50% mother tongue Italian speakers. If not, the language would be English, which in any case everyone should know well. The same method is adopted in all other European countries, with their respective languages. Besides student exchange programs, cultural and linguistic integration are promulgated through annual projects, with the help of other European schools. At the beginning of the school semester, an activity is chosen to be

either developed autonomously or in collaboration with cultural associations that have an educational interest. These types of associations, often in relation with the Ministry of Education, play an important role because they serve as a bridge between the school and the local and regional curriculums.

For example, this year's project is that of a newspaper with the theme of identity; this newspaper is developed by groups belonging to three different European schools that communicate by exchanging material and collaborating on the composition of the articles. This work is done during the hours earmarked for this project (about two hours a week). The newspaper is composed of articles in different languages, according to whoever wrote them, and is then printed on paper and published online. Dozens of students work on the project: some taking care of the layout of the articles, others of pagination and graphic design, while the teachers are responsible for having taught the subjects that concern the arguments of the project. The Principal indicates that next year a short film is planned, which will be created by many students and entered in a contest in a festival. During this explanation, all the materials needed for the fulfillment of the students' creativity are addressed: computers, scanners, digital cameras, laser printers, and CD burners.

In the labs, students work with enthusiasm: both teachers and students take responsibility for updating the software, maintaining the local network, and installing new machines. In the computer lab, you can find a man too young to be a teacher, yet too old to be a student: he is university senior, graduating in computer science, and is student teaching in the school as a technology expert. Between expert instructors, students, and student teachers there is excellent collaboration, which makes it possible for everyone to learn something, while benefiting the school at the same time. Within this institute, there are many services for all who work in the school: besides the students, the teachers' needs are seriously taken into consideration. In the faculty room, you will see not only the familiar atmosphere of the room, but also an area reserved for the use of portable computers, which are freely provided to each teacher who has obtained the European Computer License. This custom is made possible by an agreement between different branches of government and the primary computer producing companies. This agreement significantly helps boost the didactic use of new technology.

The Principal explains that a connection between the school and the family is in the works. Nothing has been set in stone because of the divergence of opinions: there are those who would prefer videoconferencing to check the progress of their children's classes, and others that consider this method an invasion of privacy. Those of this last opinion, suggest that besides simple parent-teacher conferences, the family/school relationship could be maximized with a discussion forum for each class and the possibility of communicating directly with the teacher via email.

This virtual visit ends with a consideration on the student-evaluation system: every discipline and field of study has objectives, which must be reached. The disciplines are the traditional ones, while participation in conferences, school recognized organizations, seminars; the upkeep and administration of computer labs; cultural, recreation, and sports activities all would be considered multidisciplinary projects and would receive credit. The instructor chooses the best way to reach the educational objectives and is responsible for the performance of the student. In other words, if performance is not satisfactory, the student might be required to take the class again. Every discipline and activity is valued according to a set number of credits. There is no promotion or failing at the end of the year: each student must reach a certain number of credits to take the final exam, which is the key to advancing to higher cycles of study. Every student belongs to a "traditional" class where he or she studies the mandatory subjects for that particular year. At the same time, the student can participate in additional projects and activities, with other students of the same age, creating a specific activity group with the same inclinations and interests. There is no limit on the number of activities that grant additional educational credits. This is a way to offer a different educational path for every different ability and interest.

The visit comes to an end, and after having thanked the Principal of the European Unified High School, you leave the institution with the feeling that finally the right road to modern-day education has been chosen, a road which will benefit the future citizens. These future citizens will have to face the challenges of a world being transformed by globalization; a world in which those unequipped of a pure sense of criticism, the knowledge of different languages, cultures, religions, and traditions risk to be suffocated by the old and the new stereotypes of the media, more and more enslaved to power.

BIBLIOGRAPHY

[AAVV97] Autori vari, "*Comunicazione multimediale e didattica*", Ferrara, Editore multimediale, 1997

[Ban94] Bangemann M., "The information society – new ways of living and working together", 1994, http://www.rewi.hu-berlin.de/datenschutz/report.html

[Ben97] Benvenuto M.R., "La scuola in Finlandia", 1997, http://www.graffinrete.net/tracciati/storico/tracciati1/finlandi.htm

[Cal94] Calvani A., "*Iperscuola, tecnologia e futuro dell'educazione*", Padova, Franco Muzzio Editore, 1994

[Cal99] Calvani A., "*Manuale di tecnologie dell'educazione*", Pisa, Edizioni Ets, 1999

[Cds00] Città della Scienza, "Breve storia dell' ECDL", 2000, http://www.cittadellascienza.it/ecdl/storia.htm

[Col00] Colmayer C., "Dopo l'informatizzazione: l'apprendimento e la prassi didattica" in: *Didamatica 2000 Informatica per la Didattica – lavori scientifici*, Cesena, Ponte Vecchio, 1999, 174-179

[Com02] Commissione delle comunità europee, "*Analisi comparativa dei progressi dell'iniziativa eEurope*", 2002, http://europa.eu.int/information_society/eeurope/news_library/new_documents/benchmarking/benchmarking_it.pdf

[Did00] Didasca, "La ECDL in Europa e nel mondo", 2000, http://www.didasca.it/Ecdl/EcdlEuropaMondo.htm,

[Ecd99] ECDL Foundation, "*European Computer Driving Licence Syllabus*", Dublino, ECDL Foundation, 1999

[Een01] Eenet, "Observing how learning is changing...The EENet Observatory –an Information Platform for ICT in European School Education Systems", 2001, http://www.eenet.org/documents/eenet_methodology_report_feb_01.pdf

[Esp02] Esposti M., "Moratti: ecco la mia scuola e-learning", in: *Il Sole 24 ore*, 23 Maggio 2002, http://www.kon.it/htm/moratti.htm

[Eud00] Eurydice , "Basic Indicators on the Incorporation of ICT into European Education Systems", 2000, http://www.eurydice.org/Doc_intermediaires/analysis/en/information_technology.html

[Eur97] European Commission, "*Learning in the Information Society, Action plan for a European Education Initiative (1996-98)*", Luxembourg, Office for Official Publications of the European Communities, 1997

[Eur99] European Commission, "*Serving the European Union, a Citizen's guide to the Institutions of the European Union*", 2nd edition, Luxembourg, Office for Official Pubblications of the European Communities, 1999

[Eur00a] European Commission, "*Socrates, Guidelines for Applicants*", June 2000 edition, Luxembourg, Office for Official Pubblications of the European Communities, 1999

[Eur00b] European Commission, "eEurope 2002, una società dell'informazione per tutti", 2000, http://www.europa.eu.int/information_society/eeurope/action_plan/pdf/actionplan_it.pdf

[Eur01] European Commission, "Piano d'azione eLearning, pensare all'istruzione di domani", 2001, http://europa.eu.int/eur-lex/it/com/cnc/2001/com2001_0172it01.pdf

[Fin99a] Finnish Ministry of Education, "*Education, Training and Research in the Information Society*", Helsinki, Nykypaino, 1999

[Fin99b] Finnish Ministry of Education, "*Education in Finland – Vocational Education and Training*", Helsinki, Sävypaino, 1999

[Fin00] Finnish Ministry of Education, "*Information Strategy for Education and Research 2000-2004, Implementation Plan*", Helsinki, Oy Edita Ab, 2000

[Fon98] Fontaine P., "*Europe in Ten Points*", 3rd edition, Luxembourg, Office for Official Publications of the European Communities, 1998

[FraSeg94] Franchi G., Segantini T., "*La scuola che non ho*", Firenze, La Nuova Italia, 1994

[Gor00] Gorla S., "Programma Sviluppo Tecnologie Didattiche – Rapporto di monitoraggio 2000 e prospettive", 2000, http://www.docenti.org/ntd/monit2000_1.htm

[Har98] Harjunharja Juhani, "Project Utsjoki", http://www.kuntaliitto.fi/Scripts/Get2.IDC?myAbbr=utsjoki

[Kyr95] Kyrö M., "Caratteristiche della formazione professionale in Finlandia", *Formazione Professionale - rivista europea*, 4, 1995, 23-29

[LaPa02] Labella F., Passariello G., "ECDL: considerazioni generali e qualche dato", 2002, http://www.docenti.org/TD/Ecdl/ecdl1.htm

[Lau99] Lauerma A., "Utsjoki, an example of implementing ICT in school environment in Lapland" in: Conference Educa, Berlin, 1999

[May02] Mayer M., "La literacy scientifica", *Inchieste e documenti, programma OCSE-PISA*, 2002, 16-17

[MIUR01] Ministero dell'Istruzione, dell'Università e della Ricerca "*Le risorse tecnologiche per la didattica nella scuola italiana – indagine conoscitiva*", Roma, EDS , 2001

[MIUR02a] Ministero dell'Istruzione, dell'Università e della Ricerca, "Piano nazionale di formazione degli Insegnanti sulle tecnologie dell'Informazione e della Comunicazione", 2002, http://www.istruzione.it/news/2002/allegati/linee_guida.pdf

[MIUR02b] Ministero dell'Istruzione, dell'Università e della Ricerca, "*Una scuola per crescere – Ragioni e Sfide del Cambiamento*", Roma, Istituto Poligrafico e Zecca dello Stato, 2002

[MIUR02c] Ministero dell'Istruzione, dell'Università e della Ricerca, "*Attività di formazione inerenti le competenze informatiche e tecnologiche del personale docente della scuola*", Roma, 2002

[Mpi00] Ministero della Pubblica Istruzione, "*L'innovazione tecnologica nella scuola – il presente e il futuro*", Roma, EDS, 2000

[FilOcc02] Filippazzi F., Occhini G., "Il quadro europeo delle certificazioni ICT" in: *Mondo Digitale, 3*, 2002, 61-69

[Nav01] Navanteri F. (a cura di), “Internet: ambiente per l’ambiente collaborativo e la formazione”, 2001, http://www.edscuola.it/archivio/software/interformazione.pdf

[Nur01] Nurmela J., “*Three years of the Information society*”, Helsinki, Statistics Finland, 2001

[OECD02] OECD, “*The Finnish success in PISA- and some reasons behind it*”, Jyväskylä, Kirjapaino Oma oy, 2002

[Pas02] Passariello G., “ECDL. La patente europea del PC”, 2002, http://www.docenti.org/TD/Ecdl/ecdl.htm

[Pod02] Poddighe C., “L’introduzione dell’informatica nella scuola – cenni storici”, 2002, http://www.docenti.org/TD/riflessioni/intro.htm

[SinLeh99] Sinkko M., Lehtinen E., “*The Challenges of ICT in Finnish Education*”, Helsinki, Atena, 1999

[Tel98] Tella S., “E questo è il buon esempio che ci viene dalla Finlandia” in: *Telèma*, 12, 1998, http://www.fub.it/telema/TELEMA12/Tella12.html

[Väy97] Väyrynen R., “*Global Transformation. Economics, Politics, and Culture : Suomi globaalissa työpaikkakilpailussa*”, Helsinki, Finnish National Fund for Research and Development, 1997

[Vih00] Viherä M., ”Citizens’ communication capabilities” in: *Foresight, the journal of futures studies, strategic thinking and policy*, 2 (2), 2000, 189-197

[Vih01] Viherä M., ”Communication capability as an intrinsic determinant for information age” in: *Futures*, 33 (3-4), 2001, 245-266

APPENDIX A
Questionnaire for teachers

QUESTIONS FOR IT TEACHERS

School Information

Name of the school:

Is this school specialised in a particular area?
If so, which area? (Math, arts...)

Number of students

Number of teachers

Number of IT administrators:
Who is she (a teacher, a technician, a student…)?

Teacher Information

Full name:

Sex: M F Age:

Instruction level:

Hours taught in IT per week

If there is more than one IT teacher, please write the information all of them

School Facilities / Policies

Number of computers

Other facilities:

- Printer
- Scanner
- Cd-burner
- Digital Camera
- Web-cam
- Synthesiser / MIDI
- Others: .....

Operating systems used:

- Windows 95, 98, ME
- Windows NT, 2000
- Linux
- Macintosh
- Others: .....

Is the school networked? LAN / Internet
Type of Internet connection

- Modem connection (28.8k,56k)
- ISDN connection
- DSL connection
- Other: .....

How much is the budget per year for

- purchase of software
- purchase of hardware
- development of projects involving IT

What kind of policies has the school to allow students to use computers?

School staff, calendar and courses

How many courses in computer science do you have?

Which are the contents of the courses?

Is there a school plan about the contents of the courses in computer science?

In which subjects is IT involved in your school?

- All
- Just computer science
- Specify which subjects:

Are computers used in exams or school exercises?

If yes, how?

If not, why not?

Are there gender differences in students attending courses of computer science?

- Boys are more, more interested and with better results
- Girls are more, more interested and with better results
- Same number, interest and results of boys and girls
- Others……..: ……

Is there the chance to give part of ECDL (driving licence exam for computers) in your school?

Are ECDL packages parts of the course of computer science?

How is the behaviour of students during the teaching of computer science?

Are there any projects involving technology?

- Comenius
- Newspaper production
- School web-site
- Personal homepages
- Languages learning
- Chat for cultural purposes
- Computer for disabled persons
- Virtual school and distance learning
- Other…….

How does the project get money to be implemented?

What are the aims of the project?

How many students/teachers are taking part to the project?

Is there collaboration with other schools/institutions for this project?

APPENDIX B
Questionnaire for students

QUESTIONS FOR STUDENTS
Do you think information technology is used enough in this school during school hours? How could be improved in your opinion?
How do you find courses in computer science? • Interesting / Boring • Easy / Difficult
Do you think information technology is used enough as support in all the other subjects?
Are computer science teachers enthusiasts when teaching with the help of computers? Are these teachers well prepared on their subject?

Are other subjects' teachers enthusiasts when teaching with the help of computers? Are these teachers well prepared on the use of computers?
What do you get from the school in IT? • E-mail address • Account on network • Web-space for homepage • Limited number of prints • Other:.....
In which hours can you access computers, Internet and labs?
How often do you use your computer for your homework?

APPENDIX C
Meetings, interviews and visits made

April, 2nd 2002	Håkan Mattlin	Ministry of Education
April, 4th 2002	Leena Högdahl, EU programmes	National School Board
April, 4th 2002	Ritva Kivi	National School Board
April, 8th 2002	Jaakko Kurhila	University of Helsinki
April, 9th 2002	Dir.Pietro Roselli	Italian Institute of Culture
April, 15th 2002	Prof. Kalle Juuti, Fac.of Education	University of Helsinki
April,22nd 2002	Tuula Wiikinkoski	Helsinki Educ.Department
May, 2nd 2002	Visit to Etelä-Kaarelan lukio	Taisto Herlevi
May, 3rd 2002	Conference about the "Future of small Finnish schools"	Jukka O.Mattila
May, 7th 2002	Visit to Ressun Lukio	Juha Savolainen
May, 8th 2002	Visit to Etu-Töölön Lukio	Ella Similä
May, 8th 2002	Visit to Lauttasaaren yhteiskoulun lukio	Heikki Kotilainen
May, 16th 2002	Visit to Gymnasiet Lärkan	Joakim Calais
May, 21st 2002	University of Helsinki	Jaakko Kurhila
May, 31st 2002	Marja-Liisa Viherä, Director Research Center	Sonera Telecommunications
June, 4th 2002	Anne Haarala-Muhonen	ECDL Finland
June,6-7th 2002	Partecipation at the Communication Camp di Marja-Liisa Viherä	Sonera Telecommunications
June, 10th 2002	Paul Lwoff	Maailma Tutuksi ry
June, 17th 2002	Mep Reino Paasilinna	European Parliament
June, 20th 2002	Ritva-Sini Härkönen	Ministry of Education

June, 20th 2002	Mp Martti Tiuri, Chairman of the "Comittee for the future"	Finnish Parliament
July, 1st 2002	Jari Jokinen, eEurope research group	Ministry of Education
October, 8th 2002	Isp.Lelli and research group "CM55"	"Emilia-Romagna" Region
October, 27th 2002	Guest lecturer at Päivölä seminar introducing the results of the Finnish part of the thesis	Italian Institute of Culture and Association of Italian Teachers in Finland
October, 28th 2002	Visit to Helsingin Normaalilyseo	Tuulikki Ramsay
October, 29th 2002	Marja-Liisa Viherä e Leena Viukari	Sonera Telecommunications
October, 30th 2002	Jari Jokinen	Ministry of Education
November, 8th 2002	Collaboration with EdScuola.it for the spreading of the questionnaire	Dir.Dario Cillo
November, 14th 2002	Visit to "Liceo Scientifico" in Camerino (Mc)	Prof. Giuseppe Ercoli
November, 15th 2002	Visit to "Istituto di Istruzione Superiore" in Camerino (Mc)	Prof. Tiziana Pupilli
November, 15th 2002	Visit to ITC "Antinori" in Camerino (Mc)	Prof. Curzi
November, 18th 2002	Meeting with Franco Filippazzi, ECDL Italy	AICA, Milan
November, 26th 2002	Visit to "Liceo Scientifico Morgagni", Rome	Prof. Marini
November, 27th 2002	Visit to "Istituto Professionale T.Confalonieri", Rome	Prof. Gigante
December, 4th 2002	Collaboration about questinnaires with the University of Siena	Dott.ssa Maria Piccione
January, 28th 2003	Meeting with Isp.Lelli: how to update teachers in ICT	Emilia-Romagna Region
February, 4th 2003	Visit to "Istituto Tecnico Belluzzi", Bologna	Prof. Giovanni Ragno
February, 6th 2003	Visit to "Liceo Scientifico Castelnuovo", Florence	Prof. Barbara Bellaccini
February, 6th 2003	Meeting with Prof. Raffaele Mazzella about distance learning programmes	INDIRE, Florence

APPENDIX D
Letter from the European Commission

EUROPEAN COMMISSION
Cabinet of Viviane Reding

Member of Cabinet

Brussels, 9 October 2002
JC/Lmdp D(2002)

Dear Mr Lugano,

Thank you for your e-mail dated 20 August. The subject of your thesis and the summary attached are indeed of interest, especially as you combine both the "education" and "technology" approaches. Your work will be even more valuable in that it will compare two Member States which have different cultural traditions and perceive the aspects concerned in completely different ways.

I would therefore encourage you to continue your work and to contact our Directorate-General for Education and Culture, more particularly Directorate A.3 "School Education: Socrates-Comenius" - Mr Bertrand Delpeuch, Head of Unit (tel. : + 32 2 296 87 11) and above all Directorate C.4 "Multimedia: Culture, Education and Training" - Ms Maruja Gutierrez (tel. : +32 2 295 63 46) and Mr Brian Holmes (tel. : +32 2 299 36 72). I would also advise you to contact the Directorate-General for the Information Society, for which the Finnish Commissioner, Mr Erkki Liikanen, is responsible. May I also refer you to the Internet sites of DG EAC (http://europa.eu.int/comm/dgs/education_culture/index_en.htm) and DG INFSO (http://europa.eu.int/information_society/index_en.htm).

Finally, thank you for your kind invitation to attend the seminar being organised in Helsinki. However, other professional commitments in Brussels oblige me to decline.

Yours sincerely,

Jeanne CRAUSER