

Teaching ICT in Greek Secondary Schools

Eleni Tsami, Anastasia Anastasopoulou

Abstract— This study is an attempt to describe the teaching of Information Technologies (IT) in Greek secondary education. We analyzed the detailed training programs for gymnasium and lyceum as they have been designed by the Ministry of Education of Greece. Presents the objectives, axes content, analysis axes and interdisciplinary approaches to the high school and the knowledge content axes and general objectives (knowledge, skills, attitudes and values) per class. Finally assesses the current situation and propose improvements for better operation. The most important suggestion is: “Preparation programs for teachers - students should be integrated into a comprehensive framework that is defined by technological and pedagogical dimension of Information and Communication Technologies ICT”.

Index Terms— computer science, ICT, secondary school, teaching.

I. INTRODUCTION

The integration of new technologies into all courses as an expression of a holistic and interdisciplinary approach to learning (integrated approach).

This model appeared relatively recently and is characterized in that the teaching of the use of information and communication technologies and their use is incorporated in the individual cognitive curriculum objects (assigned and provided horizontally or holistic approach).

According to this approach, issues relating to computers and new technologies in general, taught through all cognitive school items and do not constitute a particular subject area.

Proponents of this model believe that spreading the teaching and use of information across the spectrum of the curriculum and not membership of a particular object, can help effective and creative joint participation of teachers and students in the educational process.

This approach requires significantly different educational concepts, both in the choice of knowledge and teaching practice and in education and teacher training and logistical infrastructure. The twists that would cause the curriculum implementation of this approach, make it short [24], [10].

The short-term weakness of the integrated approach, and the assumption that it is necessary (at least for the moment) literacy in computing leads to pragmatic integration model. This model seems to combine the pedagogical advantages of the integrated approach to the terms of the possible. Characterized by the existence of an autonomous course general IT knowledge (in terms of computer literacy) and the

progressive integration of the use of ICT as a tool to support the learning process in all cognitive curriculum items.

II. UNIFIED FRAMEWORK CURRICULUM AND ANALYTICAL COMPUTER PROGRAMS

The introduction of IT in Greek education started in principle by the Technical - Commercial and Multisectoral Lyceum during the period 1983-1985. Then extended to high schools since 1992 where he completed after a few years. Finally, proceeded in Lyceum since 1998 and was completed after a few years. More recently extended to primary education by establishing an indicative curriculum and equipment by schools with computers.

It should be noted that the question of the level from which the Informatics taught, answered largely not on the basis of pedagogical and didactic reflection [20], [21], but with criteria that met mainly social pressures on the informatisation of the school and the educational system in general. In this context, as easiest solution first adopted, the creation of IT industry in Technical Schools (mid 80s) and then integrating a computer course in high school (early decade of 90), where the curriculum could incur relatively easily with a new lesson. Instead, the high school and the Municipal treated later, mainly for reasons related to teacher training[16],[17] and the examination system.

The period that began the integration of ICT in Greek education system (the middle 1980s), it adopted the internationally established practice of the preliminary experimental phase and then the generalizations of universal application, leading to 'de facto' establishment a model that relates to a general literacy skills course in computers and not a model where ICT is seen as a means to support the educational process.

Clearly, teaching informatics in general education should seek to establish special but at acquiring all the knowledge needed for a proper understanding of the work done with the help of a computer. Finishing high school students should have mastered the technologies of information and communication and be able to utilize rationally solving simple problems or making information processing. In this context the teaching of information technology should not be seen as a training course [3], [19].

For the first time in Greek school reality, a Unified Framework Curriculum (UFC) Computer designed and completed in December 1997 and was established in 1998. In this context, attempts to define one single way of looking at the integration of Information and Communication Technologies the Greek educational system. This framework was designed to give answers in a comprehensive manner to the main issues relating to the integration of ICT in the whole range of Greek school system (general framework,

Eleni Tsami, School of Finance and Statistics, University of Piraeus, Piraeus, Greece

Anastasia Anastasopoulou, Department of Primary Education, National and Kapodistrian University of Athens, Greece

curriculum, teaching methodology, specifications school laboratories, etc.).

The UFC 1997 slightly amended 2001-2003 implementation of Interdisciplinary Single Rich Curriculum (IUGC) but may not change either the basic philosophy and orientation, nor substantially in terms of content.

The integration of ICT in Primary Education, as determined by the Common Curriculum Framework, inspired by the integrated model of integration, while borrowing (mainly due to the conditions prevailing in the Greek school reality) ideas of factual standard.

III. INFORMATION AND COMMUNICATION TECHNOLOGIES IN SECONDARY EDUCATION

The Greek gymnasium was the first (if we exclude IT sectors of Technical Schools) school level mass introduction of an autonomic computing course in Greek compulsory education. The gradual introduction started in 1992 and completed gradually after a decade. Almost all Greek schools now has a school computer lab. The computer class one hour a week is taught in all classes of Informatics professors.

A. *The IT teaching purpose in Gymnasium*

The special purpose computer course in high school, according to Unified Framework Curriculum (UFC) identifies a comprehensive view of IT in this education level both knowledge conditions (basic concepts and terms of computer science) and through skills development conditions (acquisition command autonomy of single computer system). At the same time, approaches the issue of raising the social impact of ICT (cultivation of attitudes and values). The purpose seems to adopt the view that argues that contemporary general culture should have a strong technical and scientific component. In this component, the computer has its own position. "Specific objective of the course of Computer Science in high school is to give students all the necessary supplies to indulge in the basic concepts and terms of the Information Technology and Communication (ICT) that is attached to the instruments and techniques used for processing, transmission and receipt of any information that may be presented in digital form. To reach, all the basic simple concepts concerning the general structure of computer systems and the timeless principles that govern (computer architecture, diverse computer systems, program, organization and file management etc.). To acquire the necessary drive and critical processing skills and methodological skills trainees in a computer system and the basic tools that accompany them. To gain knowledge about the process of solving simple problems with the use of a computer, to see and understand that a simple machine is controlled and programmed by humans. Use multimedia applications, to conquer the concepts of navigation and interaction, surf the Internet, to be trained to use appropriate software to exploit the computer initially under the various courses and the subsequent activities. Discover, select, analyze and evaluate information for its use in their educational activities but also in their daily life in general. To develop codes of conduct in the context of cooperation with others, respect for their work and their diversity. To know and judge the current and future impact of ICTs in individual, social level and in the various fields of human activity. "

(Interdisciplinary Unified Framework Programme of Information Studies, November 2003)

B. *Axes implementation of the objective of Informatics at the Gymnasium*

Achieving the overall aim, requires a systematic approach and concepts culture we could classify three large and distinct themes: knowledge - communicate with the computer, using tools of expression, communication, discovery and creation, the computer at school and in society. Covered thereby important aspects that sets the pragmatic model ICT in education: acquiring knowledge and acquire a culture of information, skills and experience with computer resources, cultivation of attitudes and values on the impact of technology on our lives. Instead, the axis control-I plan computer (associated with the introduction to programming), which was a fourth broad category on IT in high school by UFC 1997 (Ministry of Education 1997), no longer appear in the new curriculum. With the axis that the students could learn about the process of solving simple problems in programming environment. The shaft know-communicate with the computer students approach all the basic simple concepts concerning the general structure of computer systems and the timeless principles that govern (computer architecture, diverse computer systems, program, organization and file management, etc.). This part of the course concerns the acquisition of all those knowledge concerning the development of a sustainable culture of students on the basic concepts of IT. Consequently, they acquire all the necessary knowledge to rationally reconstruct the functioning of equipment and software [4]. The axis using Expression tools, communication, discovery and creativity students use a base operating system and widespread use software (office applications, Internet navigation software, etc.) And operating under a variety of synthetic work. so learn to recognize the fixed and the features of various software categories and also acquire methodological character abilities. This axis combined with the use of computer in the various courses (drawing the appropriate educational software) covers most of the contact of the high school students to ICT and are of major importance for the successful integration of technology in education.

A rational practice of computer is necessary for students to define their areas of ICT application and develop their respective skills. The course helps IT, therefore, to attempt to redefine the learning process in a direction that facilitates active acquisition of knowledge and the development of methodological skills [4], [7]. The axis computer in school and in society (which according to the class concerning daily life activities or activities generally associated with society and culture) students as part of their general education aware of and consider the impact of ICT in the various sectors of human activity. Also, students are sensitized to copyright protection, information security, Internet behavior etc. At this point it should be noted that the rapid evolution of technology and the integration of applications in all aspects of human activity makes it necessary to give the citizens all those scientific tools that will enable them to judge and assess the contribution and impact of the use of new technologies in society [6].

Particular emphasis seems to be placed from the curriculum to the shaft using Expression tools, communication, discovery and creation which seeks to

engage students in activities and gain experiences that facilitate the development of the student's ability to create, activate differentiated cognitive models, through various teaching strategies emphasize the participatory - collaborative nature of learning, utilize computer technology as a learning and thinking tool and exploit the possibilities offered by the generic software for expression and communication, to develop modeling skills, information management etc. Also, those timeless experiences cultivate skills to use software, offering an overview of IT and ICT and reveal relationships between individual applications, tools etc. [11].

C. The content of analytical Axes School Informatics Programme

Table 1 contains the main sections per class of analytical IT curriculum in Greek Gymnasium. The full program with detailed contents specifying the following content axes and indicative learning hours per module, located on the PI website (www.pi-schools.gr).

Class	Axes knowledge content	General objectives (knowledge, skills, attitudes and values)
A	Acquaintance with the computer as a system	Basic IT concepts. History of computer development. The computer system hardware. The computer system software. Protection hardware, software and data, Ergonomics-Precautions
	Communicate with computer	The graphic communication environment. The environment of web presentation (web browser).
	Use tools expression, communication, discovery and creation	Expression (writing-painting) with the help of computer. Information and communication with the help of the Internet (Internet). Organization, cooperation, planning, Contribution to the group purposes. Accountability.
	The computer in school and everyday life	Uses of computer in everyday life (in school, at home, banks etc.).
B	Acquaintance with the computer as a system	Computer units. Multimedia Software (characteristics) and multimedia applications. Representation of information in a computer. Connecting Computer Networks and their functional recovery.
	Communicate with computer	Discovery of the "help" provided by the computer. Storage and file management.

	Use tools expression, communication, discovery and creation	Use tools: Numerical processing and graphical data presentation. Tool presentations. Information and communication with the help of the Internet (Internet).
	The computer in profession	Changes and effects in the working environment due to the introduction and use of new technologies. Emerging needs.
C	Acquaintance with the computer as a system	Programming languages. Basic steps of problem solving using computer. Create and execute the program.
	Use tools expression, communication, discovery and creation	Create multimedia application
	The computer in society and culture	The impact of Information and Communication Technologies in science, art, culture, language, environment, quality of life, etc.

Table 1: Axes of the Analytical Information Program in High School.

IV. INFORMATION TECHNOLOGIES AND COMMUNICATION IN UPPER SECONDARY SCHOOL (LYCEUM)

A. Information as general education course at the Lyceum

With the introduction of the Lyceum (and since the school year 1998-1999, according to Law 2525/97 (Government Gazette 188 A ')) Informatics part as general education course (choice) in all three classes (A, B, and III high school) and course (compulsory and elective) technological direction in Third Grade.

It is remarkable that this lesson (Information Technology and Computer Applications) are not institutionalized as mandatory but as a choice. In this way, the high school students encounter last ICT within a subject but not directly related to their future professional orientation [11].

Under this perspective, IT as general education course of the Lyceum is not designed vocational training of students in IT occupations but the continuation and deepening of the knowledge acquired in previous levels of education and their adaptation to new developments of ICT.

This comprehensive training in the use and in the basic and timeless concepts of information technology would ensure the sharpest way the efficient diffusion of ICT across the spectrum of the curriculum [10].

In High School No changes in IT curriculum, following the introduction of the 1998. In this section we will study IT as general education course at the Lyceum.

B. The general purpose of the IT Lyceum

The general purpose computer course in High School, according to the UFC is the following:

" The IT Applications electives and Computer Applications included in the curriculum of A and B / C grades respectively of the Lyceum and have general shooters extension of the general IT students' education with emphasis on capacity building and skills in the use and exploitation of computer and network technologies as a learning and thinking tool informing students on computer applications in the modern world and especially for potential prospects that creates the industry / direction chosen (or will choose) to study awareness, reflection and critical capacity development by students, social, ethical, cultural, etc. issues raised by the "invasion" of computer and network technologies in all areas of human activity. (Unified Framework Studies Informatics Program, December 1997)

C. Axes implementation of general purpose

The approach of the concepts and teaching skills required for the implementation of general purpose are classified in accordance with the curriculum, in three areas: o world of IT, probe-create-discover, information technology and modern world.

The world of IT: students enrich their knowledge and experiences on IT applications in the modern world and become more familiar with the concepts, tools and techniques of computer and network technologies.

Probe-create-dig: students operate in more complex and integrated operations using general-purpose application software, educational software, programming tools, multimedia application development software and network software.

Information technology and modern world: students informed about new scientific and technological disciplines and new business prospects generated and discuss the effects of information technology in various fields of human activity. Sensitized and puzzled over in modern and open issues posed by the invasion of ICT in people's lives (the limits of the potential of new technologies, privacy, addiction risks and dependence, the reliability of information, the offenses on the Internet, etc.).

D. Knowledge and skills to be acquired

According to UFC, students who have successfully followed the courses of Computer Applications in High School must:

"Can describe the meaning, purpose and stages of development of information systems can distinguish and recognize the applications of information technology in the modern world to know the basic categories of computer systems and describe the key features of the operation and their potential to choose, whenever you need the appropriate software be able to describe the features and capabilities of modern programming tools can solve simple problems using programming tools be able to develop simple multimedia applications understand and be able to explain basic concepts and terms of modern network technology they can use the Internet and to create their own pages on the global information web can judge the impact of information technology on people's lives have gained sufficient insight into the applications and possibilities offered by computing and networking technologies in the direction / field they

chose to study. (Unified Framework Studies Informatics Program, December 1997).

E. Content Axes of Informatics curriculum Lyceum

The following table (Table 2) shows the core modules (content axes) of the detailed IT curriculum as general education course at the Lyceum.

Unit	A' Class	B'or C' Class
1. IT world	Overview IT applications. Computer Categories Computer hardware Application software. Programming environments. Information systems. Teaching hours: 20	Focused review. Applied Informatics. Multimedia. Communications and Networks. Teaching hours: 15
2. Investigate-Create-Discover	Synthetic work with generic applications software, educational software and programming environments. Teaching hours: 27	Synthetic work with universal application software, multimedia software development, network software, educational Software and programming environments. Teaching hours: 30
3. IT and modern world	Everything changes... New business prospects Teaching hours: 3	The future... Teaching hours: 5

Table 2.: Axes of the Analytical Information Program in Lyceum

V. TECHNOLOGIES OF INFORMATION AND COMMUNICATION IN TECHNICAL LYCEUM

In Technical Lyceum Informatics is taught in all three classes in Information Technology - Computer Networks. Specifically the 1st Round of Class taught the course "Fundamentals of Computer & Digital Engineering", "Introduction to Operating Systems", "Basic of Web Services", "Office Automation", "Computer Hardware" and "Workplace."

Subsequently, the first cycle of the second class taught courses "Operating Systems", "Database", "Data Transmission and Computer Networks", "Media", "Computer Programming", "Commercial Applications", "Computer Maintenance" and "Computer Product Sales Techniques". In the second cycle of the A class taught "Information Systems", "Data Transmission and Computer Networks (II)", "Programming the Internet Tools", "Organization and Operation of Information Centers", "Multimedia" and

"Information Society and Design & Application Implementation".

VI. CONCLUSION

In this work there has been an attempt to present the study of ICT in Greek secondary education.

It is indisputable that the factors on which the level, quality and effectiveness of education depend are many. Among them is the teacher, the logistical infrastructure, programs and books, its relationship to the production process and social life, organization, management and operation of schools. Each of these factors is crucial to the efficiency of education and undoubtedly, the most decisive of all was and will be the factor "training."

The new ICTs, as often emphasized by scholars of their introduction to education [2], [5], [12], [24],[25], are not intended crowding teacher (will not could indeed), but rather are a necessary and valuable assistant. Even in science teaching where ICT potential to represent and to model physical phenomena support a more "learner-centered" learning model, their role is recognized as an ancillary [6]. The computers, the internet and general ICT can be used as a means of assisting the educational work and of strengthening learning through application software, which is characterized as "educational software".

Although many researchers [1], [26], [27] disagree with the possibility of comparative evaluation of the effectiveness of various ICTs input methods in the learning process (multimedia applications, distance education systems, etc.) compared to traditional teaching systems seem to agree that no technological or communication tool by itself cannot improve the learning effectiveness unless accompanied and not part of a pedagogical sense and does not serve a structured educational process. Based on these findings, the theoretical principles of evaluation seem to be displaced by technological parameters to investigate the factors that determine the pedagogical framework which takes the teaching process [3], [5], [12].

Basic axis for the introduction and use of ICT in new educational environments is considered to be both the cultivation and development of creative thinking of students and changing teaching practice, learning and communication process, where knowledge is approached by definition probing, so it is possible to develop an interdisciplinary and multidisciplinary nature of pedagogical studies [13], [8]. As also reflected in official texts educational policy, promotion of new technologies in education is closely related to and dependent on the cultivation of a new communication (learning) process, primarily interactive, social, active and evolutionary, achieved through complex and flexible teaching approaches [14], [15]. At the level of higher education through the introduction of ICT, often given the opportunity to teachers / only three different disciplines and from different departments or faculties to work for the production of educational materials and the adoption of innovative teaching methodologies and to promote interdisciplinary understanding and cooperation. The new technologies have the potential to multiply the results of the educational 'upgrade', but the quality, direction and pedagogical and social character depends on perceptions, intentions and actions of all stakeholders, particularly

political, social and educational. Because of the modernization we envision in education through the use of new technologies is not just to use a technologically advanced tools and a more conventional medium of instruction – hope and requires - substantial changes in the nature of traditional teaching and school culture of learning, in terms of cognitive development and model of the learner and tomorrow's citizens sought, relationships and psychosocial climate of the learning process, the role of the teacher and the school in general.

The creative use of the potential of new technologies in education, in conjunction with the release of productive, radical and creative forces of teachers and students, it is possible under certain conditions to help reduce many undesirable characteristics of traditional teaching and cause beginning of a renaissance period in school pedagogy actually which hopefully will have an impact on the wider society.

One of the most important conditions for the realization of this vision is the existence of appropriate pedagogical education and teacher training as well as ongoing support them in their difficult task, the context of an education system, which is supposed to be consistent with modern educational principles, many from which enunciated verbally today, but in practice remains mostly inactive. Because so liberating, and negative potential of this new, revolutionary machine, as is usually called the computer, this is self-evident and not realized mechanically and seamlessly, but require some changes in attitudes and practices of all entities involved in the educational process.

In this context, as repeatedly noted in the literature, the role of the teacher is central, which is why the development of educational, professional and personal skills now regarded as a sine qua non for achieving the desired educational changes, particularly changes based on exploiting the educational potential of new technologies. Given that the teacher is now a seasoned, and lifelong learner scientist, care needs to offer educational-political system seems to be as important as the care they ask the teacher to demonstrate to his students.

Teachers should first be aware of the need to modernize teaching methods but also to understand the fact that computers are used in the educational process additives and adjuvants and in any case not replace the important role played by the teacher in the classroom. All teachers are required to learn the use of computers and the popular programs. With them will be able to respond minimally to use educational software in teaching. Also schools must create an environment to help teachers deal with the use and construction of educational software.

The integration of new technologies into the educational process is a very difficult and complicated process. The results of the study aims to contribute to the problem that develops in our country for the proper preparation of teachers and students to effectively use educational technology in teaching practice. Preparation programs for teachers - students should be integrated into a comprehensive framework that is defined by technological and pedagogical dimension of ICT.

It is imperative for the wider Greek education system to identify and adopt an integrated model training for all aimed at integrating ICT in education. The success of this will be determined by factors such as the continuous pedagogical support, determining the purpose of integration of ICT in

education in terms of pedagogy and didactics, acquiring temporal computer skills, acquisition of temporal computer skills, and the growing overall culture application ICT in education.

The possibility of appropriate evaluation and selection of appropriate educational software, characterized equally important factor in familiarizing teachers - students, the successful integration of computer applications in the educational system. The process of evaluation of programs deemed momentous and needs to pay careful attention to software imported ready from other countries. It is important to have a reliable evaluation system that meets the learning needs of students.

It should also be noted that it is very important to involve teachers in the development of appropriate educational software whose directions and opinions necessary for the educational profile of these products. The downside is that until now the construction projects done by individuals and corporate executives.

Finally it should be emphasized that the teacher is the one who plays the key role in the development of software in the teaching practice. The contribution is to help children to learn in the process of discovery and problem solving and to link the activities of PC's with other learning activities.

Information technology in the educational process is an undeniable reality and not merely meant the introduction of a new tool in teaching all levels, but developing a new dimension of educational technology. The computers used in education in various ways. But the fact is that they have different views on the effectiveness of their use in teaching. Nevertheless it has been argued that the computer in financial education has the potential to provide valuable assistance to both teachers and students. It can provide learning opportunities with the overall objective to facilitate the teacher to become contagious and students to enhance their understanding. Thus, teachers knowing the advantages of technology trying to get acquainted with her. At the same time, they should help and the creation of appropriate educational software.

The development of educational software in our country is in its very early stages. The rigidity of our educational system, together with the lack of teacher training in new technologies make difficult the task of integration of computer applications in the teaching process.

Gradually it becomes more intense the need to integrate computer applications in teaching methods so that they can follow the latest trends of the season. Besides information technology has penetrated into all areas of our lives, so the use of and the generalization of the educational process in the future is considered certain.

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Eleni Tsami is member of the laboratory teaching staff at the Department of Statistics and Insurance Science, School of Finance and Statistics of the University of Piraeus. She studied Mathematics in National & Kapodistrian University of Athens, she also studied 'Methodology of Mathematics' (MSc) in National and Kapodistrian University of Athens and 'Banking' in Greek Open University (MSc). She holds a Phd from the University of Piraeus (thesis title: Teaching Economics in Higher Education with the use of new technologies). She was a part-time tutor in University of Piraeus 2005-2010 and she was an adviser in Ministry of Development (2000-2004), Ministry of National Education and Religious Affairs (2004-2009), General Secretary of Mass Media (2012-2014) and Ministry of Interior (2014-2015). She is member of Hellenic Mathematic Society (2004-today)..

Anastasia Anastasopoulos is a PHD student at the Department of Primary Education, National and Kapodistrian University of Athens. She also studied Philosophy, Pedagogy and Psychology – School of Philosophy and ICT in Education (MSc) at the same University.