A COMPARATIVE STUDY BETWEEN THE EUROPEAN UNION COUNTRIES' AND TURKEY'S EDUCATION SYSTEMS REGARDING THE INTEGRATION OF INFORMATION AND COMMUNICATION TECHNOLOGIES

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Approval of the Graduate School of Natural and Applied Sciences

Prof. Dr. Tayfur ÖZTÜRK

Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

Assoc. Prof. Dr. M. Yaşar ÖZDEN

Head of Department

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science.

Asst. Prof. Dr. Zahide YILDIRIM

Supervisor

Examining Committee Members

Assoc. Prof. Dr. Safure BULUT

Asst. Prof. Dr. Zahide YILDIRIM

Asst. Prof. Dr. Ercan KİRAZ

Dr. Kürşat ÇAĞILTAY

Dr. Hasan KARAASLAN

ABSTRACT

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Göktaş, Yüksel

M.S., Department of Computer Education and Instructional Technology

Supervisor: Asst. Prof. Dr. Zahide Yıldırım

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The dawn of the information age brought drastic changes in all of the society's systems, including education. In this context, ICT has a critical role as enhancing the dissemination of information among all countries. Nowadays, the EU countries are now attaching a very high priority to ICT in their national education policies, and seeking to adjust the way their education systems are organized. There is also a need in Turkey to reveal the educational policies related to ICT and to build up a road map pertaining to these policies in process of joining the European Union.

The main purpose of this study is to reveal the differences and similarities between the EU countries' and Turkey's educational system in terms of integration of ICT into national education policies, curricula and teacher education programs. Another purpose is to emphasize main issues of ICT policy and its implementation in terms of education in the European Union countries and Turkey.

This research was developed as a comparative study. Therefore, the primary data for the study was gathered from the official documents. It covers 15 countries, which are the members of the EU, and Turkey. First of all, the data related to these countries was gathered. Secondly, the official documents, reports, and the other related data was organized with in the five categories which constituted the research questions. After that, the categorized data was compared. Finally, major findings related to this study were revealed and their implications for practice were suggested in this study.

The results indicated that importance of the ICT in education is being raised in both Turkey and the European Union countries. But, Turkey has to take required measures in order to catch up with the EU standards.

Keywords: Information and Communication Technology, Comparative Study, the European Union, Education Policies, Curricula, Teacher Education, National Projects.

ÖZ

AVRUPA BİRLİĞİ ÜLKELERİ VE TÜRKİYE'NİN BİLGİ VE İLETİŞİM TEKNOLOJİLERİNİN EĞİTİM SİSTEMLERİNE BÜTÜNLEŞTİRİLMESİ AÇISINDAN KARŞILAŞTIRMALI BİR ÇALIŞMA

Göktaş, Yüksel

Yüksek Lisans, Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü

Tez Yöneticisi: Yrd. Doç. Dr. Zahide Yıldırım

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Bilgi çağının başlangıcıyla toplumun tüm sistemlerinde, eğitim sistemi de dahil olmak üzere, önemli değişiklikler ortaya çıkmıştır. Bu bağlamda bilgi ve iletişim teknolojileri bütün ülkelere bilginin yayılmasında etkili bir role sahip olmuştur. Günümüzde Avrupa Birliği ülkeleri bilgi ve iletişim teknolojilerinin ulusal eğitim politikalarına bütünleştirilmesine öncelik tanımakta ve bu yolla eğitim sistemlerini düzenlemektedirler. Türkiye'nin de bilgi ve iletişim teknolojilerine yönelik eğitim politikalarının belirlenmesine ve Avrupa Birliği'ne giriş sürecinde bu konuda bir yol haritası çıkarılmasına ihtiyacı vardır.

Bu çalışmanın temel amacı, bilgi ve iletişim teknolojilerinin ulusal eğitim politikalarına, müfredata ve öğretmen yetiştirme programlarına bütünleştirilmesi açısından Avrupa Birliği ülkeleri ve Türkiye'nin eğitim sistemleri arasındaki benzerlik ve farklılıkları ortaya koymaktır. Diğer bir amacı da Avrupa Birliği ülkeleri ve Türkiye'de bilgi ve iletişim teknolojileri politikalarının ve bu politikaların eğitimde kullanılmasının ana hususları üzerinde durmaktır.

Gerekli olan temel veriler resmi belgelerden elde edilerek, karşılaştırmalı bir çalışma yapılmıştır. Bu çalışma, Avrupa Birliği üyesi 15 ülkeyi ve Türkiye'yi kapsamaktadır. İlk önce, bu ülkelerle ilgili veriler toplanmıştır. Ardından, araştırma sorularına göre belgeler, raporlar ve diğer ilgili veriler incelenmiş ve beş grup altında toplanarak karşılaştırılmıştır. Son olarak, bu çalışmada konu ile ilgili bulgular üzerinde durulmuş ve uygulamaya yönelik öneriler sunulmuştur.

Sonuçlar göstermiştir ki; eğitimde bilgi ve iletişim teknolojilerinin önemi Türkiye ve Avrupa Birliği ülkelerinde giderek artmaktadır. Ancak, Türkiye Avrupa Birliği standartlarını yakalayabilmek için gerekli tedbirleri almalıdır.

Anahtar Sözcükler: Bilgi ve İletişim Teknolojileri, Karşılaştırmalı Çalışma, Avrupa Birliği, Eğitim Politikaları, Müfredat, Öğretmen Eğitimi, Ulusal Projeler.

To My Mother's Brother, Ahmet Kaya,

Who Passed Away in a Traffic Accident

at 27 December 2002

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NATIONAL ABREVIATIONS IN THEIR LANGUAGE OF ORIGIN

BECTA : British Educational Communications and Technology Agency

CNICE : Centro Nacional de Información y Comunicación Educativa

EGİTEK : Eğitim Teknolojileri Genel Müdürlüğü

MEB : Milli Eğitim Bakanlığı

GCE : General Certificate of Education

HF : Højere Forberedelseseksamen

IUFM : Institut Universitaire de Formation des Maîtres

NCCA : National Council for Curriculum Assessment

OECD : Organization for Economic Co-operation and Development

ICT : Information and Communication Technology

GNP : Gross National Income Per Capita

PC : Personal Computer

COUNTRY CODES

EU : European Union

B : Belgium

B fr : Belgium – French Community

B de : Belgium – German Community

B nl : Belgium – Flemish Community

DK : Denmark

D : Germany

EL : Greece

E : Spain

F : France

IRL : Ireland

I : Italy

L : Luxembourg

NL : Netherlands

A : Austria

P : Portugal

FIN : Finland

S : Sweden

UK : United Kingdom

E : England

W : Wales

NI : Northern Ireland

SC : Scotland

STATISTICAL SYMBOLS AND ABBREVIATIONS

(-) : Not applicable

(*) : Recommendations solely on the inclusion of ICT in other objects

(#) : Autonomy/No recommendations for hours to be allocated to ICT

CHAPTER 1

INTRODUCTION

1.1. Background and Rationale for the Study

Today's society has undergone several massive changes from the agrarian age to the industrial age, and now entering into what some call the information age. The dawn of the industrial age brought with it drastic changes in all of the society's systems, including family, business, and education. Society is changing in sweeping ways that make our current educational systems obsolete. These changes also affect today's primary, secondary, vocational, higher, corporate, and health education contexts (Reigeluth, 1995).

As an integral part of today's society, the education system is facing new challenges which arise from this societal transformation and transcend various boundaries. In this context, information and communication technologies (ICT) have a critical role as enhancing the dissemination of information among all countries. Hence, education systems have gotten developing new approaches.

ICT can be broadly defined as the set of technologies that enable the collection and processing of the collected information, storage of it and the automatic transfer of this information to somewhere else or access them remotely when needed by means of electronics and/or optics, etc. technologies (Ceyhun & Çağlayan, 1997). The following sub-sectors constitute the value chain of ICT (TUENA, 1999):

- equipment and material production (electronics industry),
- communications infrastructure construction / operation (network operator),
- software development (software industry),
- content production / supply (content industry).

There is a discussion regarding the changes that emerged as a consequence of rapid developments in a short time. However, ICT has entered the interest areas of many disciplines.

The need to incorporate ICT into education is now inescapable, largely as a result of the growth of the Internet. Many action plans were adopted at national and European levels, as well as investment in computerization, teacher education and the updating of curricula. While the pace of such developments varies greatly, there is no doubt that all countries of the European Union (EU) are now attaching very high priority to ICT in their national policies, and seeking to adjust the way their education systems are organized and function as a result (EURYDICE, 2001a).

Similarly, Turkey aims to improve the quality of education by integrating ICT, which is significant in the process of joining the European Union. Therefore, improving a common education policy is very important for this purpose.

1.2. Statement of the Problem

ICT has induced sometimes radical changes in certain sectors activities. It is to be expected that changes on the same scale will occur in education systems. ICT has led to reconsideration of priorities in education. The new technologies are potentially vehicles for change and innovation. They may encourage pupils to abandon passive listening in favor of more responsive engagement, help to bring the outside world into the school and more generally change the way education is dealt with. ICT is neither a substitute for "traditional" learning and teaching nor a substitute for students' using their minds and imaginations. The role of ICT is to serve education, in particular, by helping students to learn more effectively and by helping teachers to do their job. ICT should be used in all services of the curriculum, and it should be arranged available to help teachers to manage the learning process. Because of these reasons, starting in 1983, the European Commission acted as a catalyst and gave the lead by encouraging the incorporation of ICT into education and vocational training (EURYDICE, 2001b).

The reasons indicated above have emerged, a new interest in ICT in education recently. However, there is not enough research on this subject. There is a need for many more studies on the integration of ICT into education by the European Union

countries' and Turkey's policies. The indicators of this technology have been incorporated to the national education policies, curricula and teacher education.

1.3. Purpose of the Study

The European Union aims to improve the quality of education by encouraging cooperation among the accession countries. ICT has an important role in this policy.

Therefore, the main purpose of this study is to reveal the differences and similarities between the EU countries' and Turkey's educational systems in terms of integration of ICT into national education policies, curricula and teacher education programs. Another purpose of the study is to emphasize main issues of ICT policy and its implementation in terms of education in the European Union countries and Turkey. This study attempts to answer the following research question:

What are the similarities and differences between the European Union countries' and Turkey's education systems pertaining to the national education policies, curricula and teacher education in terms of the integration of ICT?

1.4. Significance of the Study

At the beginning of this century, education has faced an important challenge: how to provide high quality of education and training attuned to the 21st century for all human beings who need it and can profit from it in the most cost-effective way. Information and communication technologies can help to meet these challenges; therefore, the European Union attaches great importance to it. In addition, education is the main concern of governments in all the European Union countries; however,

the structures of education systems show differences significantly, both in the European Union countries and in Turkey.

This study addresses the main issues related to the comparison of the European Union countries' and Turkey's education systems pertaining to the national education policies, curricula and teacher education for the integration of recent information and communication technologies. Consequently, this study may contribute to reveal the educational policies and build up a road map pertaining to education regarding the integration of ICT Turkey's process of joining the EU. Additionally, the results of this study can help researchers and legislators in Turkey and in improving a common education policy during the process of entering to the European Union.

1.5. Definitions of the Concepts and Terms Used in the Study

ICT: ICT stands for Information and Communications Technology which is currently defined as the set of activities that facilitate by electronic means the processing, transmission, and display of information (OECD, 1997). ICT can be broadly defined as the set of technologies that enable the collection and processing of the collected information, storage of it and the automatic transfer of this information to somewhere else or access them remotely when needed by means of electronics and/or optics, etc. technologies (Ceyhun & Çağlayan, 1997).

ICT is at the convergence of a tripod made of three specialized domains, namely information technology, data and information, and socioeconomic issues, to

fuse the capabilities and functionality of each specialized domain into a holistic yet fluid domain that works to develop a customized information system for each user.

IT: IT stands for Information Technology which was defined in 1990 as the aggregation of information-related fields, such as computer hardware and software, telecommunications networks and equipment, and information technology-based industries. The application of these technologies in all sectors, publishing, broadcasting, libraries, databanks, and other information services industries. The major difference between IT and ICT is the emphasis given in the case of ICT to the communication aspects which are the collaboration and connectivity that the technologies facilitate (ASIAN DEVELOPMENT BANK, 2001).

According to Yıldırım, "the term "IT" has different meanings and functions for different areas of study. For instance, in education is perceived as not only a tool to be used for enhancing teaching and learning but may be a change paradigm in the classroom or in the educational system" (Yıldırım, 2000b).

Integration of ICT: The use of information and communication technologies by everybody in all fields of education. A predetermined process has a significant importance for integration of ICT in classroom, curriculum, school management, library and any educational settings.

Use of ICT: Meaningful use of information and communication technologies for somebody and somewhere in short term. Use of ICT is important to enhance quality of education, i.e. how technology might enable us to create alternative pathways.

The European Union: The historical roots of the European Union lie in the Second World War. The EU was conceived in the search for a model of European integration that would prevent such killing and destruction from ever happening again. The idea was first proposed in a speech by the French Foreign Minister Robert Schuman on 9 May 1950, a date considered as the birthday of what is now the EU. Ever since, cooperation has gradually been expanded and adapted to new challenges according to what a majority of Europeans could agree upon. The latest changes in the basic rules are contained in the 1999 Treaty of Amsterdam (The Representation of the European Commission to Turkey, 2002).

The European Union is currently made up of 15 countries committed to working together for peace and prosperity. They form the largest voluntary and peaceful bloc in the world - 379 million European citizens facing together the challenges of our time (The Representation of the European Commission to Turkey, 2002).

The European Union is a unique organization. It is not a new state that will replace the existing states. But the EU is more than any other international organization: its member states have gradually transferred specific powers to the European level, so that democratic decisions on questions of truly European importance can be made at European level. Europe is a continent with many different traditions and languages, but also with shared values. The main aim of the European Union is to create ever-closer cooperation among the European peoples, where decisions are taken as close to citizens as possible (The Representation of the European Commission to Turkey, 2002).

In the beginning much of the cooperation was about trade and economy, but now the EU also deals with many other subjects of direct importance for our everyday life. In the increasingly interdependent world of the 21st century, it will be even more necessary for every European citizen to cooperate with people from other countries in a spirit of curiosity, tolerance and solidarity (The Representation of the European Commission to Turkey, 2002).

After successfully growing from 6 to 15 members, the European Union is now preparing for its biggest enlargement ever in terms of scope and diversity. 13 countries have applied to become new members: 10 countries in central and Eastern Europe - Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic, Slovenia, Malta, Cyprus and Turkey (The European Union, 2002).

These countries, with a wealth of different histories and cultures, have been preparing for membership for more than a decade. In order to join the Union, they need to fulfill the economic and political conditions known as the 'Copenhagen Criteria', according to which a prospective member must:

- be a stable democracy, respecting human rights, the rule of law, and the protection of minorities;
- have a functioning market economy;
- adopt the common rules, standards and policies that make up the body of the EU law.

The EU assists these countries in taking on the EU laws, and provides a range of financial assistance to improve their infrastructure and economy. Negotiations for membership are under way with 12 of the applicant countries (not yet with Turkey, which does not yet meet the political conditions). On 9th October 2002, the Commission recommended to close negotiations with Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, the Slovak Republic and Slovenia. The objective is that the first group of new members should join the EU in time for the elections to the European Parliament scheduled for June 2004 (The European Union, 2002).

CHAPTER 2

REVIEW OF RELATED LITERATURE

This chapter provides a review of literature related to this study. The literature review is presented under five main sections: Information and Communication Technologies, ICT in the national education policies, ICT in the national education projects, ICT in the curriculum, and ICT in the teacher education.

2.1. Information and Communication Technologies

ICT stands for Information and Communications Technologies which is currently defined as the set of activities that facilitate by electronic means the processing, transmission, and display of information (OECD, 1997). These technologies were divided into five subs – categories by United Nations Research Institute for Social Development in Geneva (UNRISD, 2001):

- **Capturing technologies,** with input devices that collect and convert information into digital form. Such devices include keyboards, mice, trackballs, touch screens, voice recognition systems, bar code readers, image scanners and palm-size camcorders.

- **Storage technologies**, producing a variety of devices to store and retrieve information in digital form. Among these are magnetic tapes, floppy disks, hard disks, RAM disks, optical disks (such as CD-ROM), erasable disks and smart cards (credit-card sized cards with memory and processing capacity for financial transactions or medical data).

- **Processing technologies**, creating the systems and applications software that is required for the performance of digital ICT.

- **Communications technologies**, producing the devices, methods and networks to transmit information in digital form. They include digital broadcasting, integrated services digital networks, digital cellular networks, local area networks (LANs), wide area networks (WANs, such as the Internet), electronic bulletin boards, modems, transmission media such as fiber optics, cellular phones and fax machines, and digital transmission technologies for mobile space communications (the Low Earth Orbit satellite voice and data services). Computer-mediated communication (CMC) may be two ways:

    - **Synchronous:** The parties communicate both ways at the same time, just like having a live conservation on a telephone. Such as, chat rooms, audio teleconferencing, and video teleconferencing (Alessi and Trollip, 2001).

- **Asynchronous:** There is a time lag among the parties, as when you leave a message on a telephone answering machine that will be listened to at a later time. Such as e-mail, listservs, bulletin boards, and newsgroups (Alessi and Trollip, 2001).

- **Display technologies**, which create a variety of output devices for the display of digitized information. Such devices include display screens for computers, digital television sets with automatic picture adjustment, set-top boxes for video-on-demand, printers, digital video discs (which might replace CD-ROM drives and audio CD players), voice synthesizers and virtual reality helmets.

2.2. ICT in the National Education Policies

Bell (1973), Reich (1991), and Toffler (1980) have identified several massive changes that today's society has undergone, from the agrarian age to the industrial age, and now entering into what some call the information age (cited in Reigeluth, 1995).

According to Reigeluth, the dawn of the industrial age brought with it massive changes in all society's systems, including the family, business, and education. In fact, that is the only time in the history of the United States that education has undergone a paradigm change -from the one-room school-house to the industrial, assembly-line model we have today. The current system is substantially the same as it was when we became an industrial society. The reforms that have been made since then have all been piecemeal changes. Now we are entering the information age, we find that paradigm

shifts are occurring or will likely soon occur in all of our societal systems, from communications and transportation to the family and the workplace (see table 2.1). It is little wonder that we again find the need for a paradigm shift in education. Society is changing in sweeping ways that make our current educational system obsolete, in higher, corporate, health education and so forth (Reigeluth, 1995, p.86).

Table 2.1: Major Differences between the Industrial Age and the Information Age That Affect Education (Reigeluth, 1995).

Industrial Age	Information Age
Adversarial relations	Cooperative relations
Bureaucratic organization	Team organization
Autocratic leadership	Shared leadership
Centralized control	Autonomy with accountability
Autocracy	Democracy
Conformity	Diversity
Compliance	Initiative
One-way communications	Networking
Compartmentalization	Holism

Table 2.1 shows some of the major differences between the industrial age and the emerging information age. These differences have important implications for the features of the new educational system: how it should be structured, what should be taught, and how it should be taught.

Table 2.2: Emerging Pictures of Features for an Information Age Educational System Based on Changes in the Workplace (Reigeluth, 1995)

Industrial Age	Information Age
Grade levels	Continuous progress
Covering the content	Attainment-based learning
Norm-referenced testing	Individualized testing
No authentic assessment	Performance-based assessment
Group-based content delivery	Personal learning plans
Adversarial learning	Cooperative learning
Classrooms	Learning centers
Teacher as dispenser of knowledge	Teacher as coach or facilitator of learning
Memorization of meaningless facts	Thinking, problem-solving skills and meaning making
Isolated reading, writing skills	Communication skills
Books as tools	Advanced technologies as tools

Table 2.2 shows some of the major differences in terms of educational system based on changes in the workplace between the industrial age and the emerging information age. Accordingly, "Two things educators know for certain are that different people learn at different rates and different people have different learning needs, even starting from their first day at school. Industrial age educational systems present a fixed amount of content to a group of learners in a fixed amount of time, so it is like a race to see who receives the A's and who flunks out. To emphasize learning, the new system must no longer hold time constant and allow achievement to vary. It most holds achievement constant at a competency level and allows learners as much time as they need to attain competence. There is no other way to

accommodate the facts that different people learn at different rates and have different learning needs. However, to have an attainment-based rather than time-based system, we must in turn have person-based progress rather than group-based progress. That in turn requires changing the role of the teacher to that of a coach or facilitator, rather than that of dispenser of knowledge to groups of learners who passes by at the ring of a bell like so many little widgets on an assembly line" (Reigeluth, 1995, p.87).

A number of important trends in education and training have emerged over the last 20 years or so which have paved the way for an initiative like this. ICT have not only had a profound effect on many aspects of economic and social life during the 1990s and early years of the 21st century, but also on teaching and learning (La Velle & Nichol, 2000).

What is the role of ICT in education? In the information age, ICT has a critical role of enhancing the quality of education. It is in no sense a substitute for "traditional" learning and teaching. Nor is it a substitute for students using their minds and imaginations. The role of ICT is to serve education: in particular, by helping students to learn more effectively and by helping teachers to do their professional job. Attempts are sometimes made to suggest that ICT is in some way the property of a particular educational philosophy, although, we do not see it that way. The best analogue we have heard for ICT is the analogue with the invention of electricity. Electricity has come to serve almost every aspect of society. It should be used in the service of the curriculum, and should be made available to help teachers

to manage the learning process; however, that is defined by them (The Independent ICT in School Commission, 1997).

According to Pelgrum (2001) many governments have, in the late 1990s, developed plans to intensify their investments regarding ICT in education. The quick rise of the Internet and worldwide web (WWW) has led to the adoption of objectives to equip all schools with access to these facilities in a relatively short period of time.

ICT in education is an area which in turmoil and in which many participants play a role. Forces that operate on the micro level of education system (that is at schools and in classrooms) may be influential in bringing about changes that are beyond the direct control of ministries of education. Therefore, it is important for educational decision making to periodically assess the actual situation of ICT in educational practice (Pelgrum, 2001).

Most policy documents refer explicitly to the effects the countries expect of ICT in education and which legitimize a high priority in policymaking and the spending of considerable amounts of money. It is clear that ICT is not an isolated subject, but ICT in education is integrated in wider education (and socio-economical) policy plans concerning the life-long-learning concept, new key skills, citizen competences and information handling skills and new education concepts where traditional roles of teachers and students are thought to change. While describing the importance of ICT in education, the following issues are often stated (ICT League Paper, 2002):

a. The economic importance of a high level of ICT skills of the workforce. In a more global economy, with fast technological developments competition between countries depends to a great extent on the level of ICT skills of the workforce. It is vital for future job creation and welfare that individuals are highly skilled in the use of new technologies. This applies not only to those who enter the labour market for the first time, but concerns the reservoir of unemployed who does not have the right skills for the information age as well. Taking into account the fast changes in ICT, this also means that countries want to create a learning society where all individuals regularly update skills and are able to learn (life long learning).

b. ICT as a tool to help create equal opportunities. ICT can give people with learning difficulties and/or physical handicaps, better opportunities to study and improve the quality of life. Because ICT is instrumental in creating flexible and user compatible training arrangements, it can help to create equal opportunities for competence development regardless of gender, geographical location, social situation, illness or other circumstances.

c. ICT as a catalyst for change. In this view, introduction of ICT is seen as helpful in making the education system more effective and more flexible. In order to face new challenges, the education system must adopt new methods; develop new content, new types of delivering education, other organization models and methods of collaborating. The countries here use ICT as a catalyst for change and the development of new roles for pupils, students and

teachers. Many countries are involved in major educational reforms in which ICT plays an important if not leading role.

d. ICT as a means to improve the quality of learning. The learning process could be made more attractive and more effective through a well balanced and integrated use of ICT tools. ICT has the ability to improve the quality of the learning process and motivate the students. ICT rich learning environments challenge students to change their attitude requiring them to assume more responsibility for their learning, using inquiry, collaborative, technological and problem solving skills. ICT helps build students' self-esteem, empowering and enabling them as well as building their confidence and feelings of success.

Content of the concrete policies, all countries have a wealth of different lines of action, projects and initiatives, taken at different levels and by various parties involved. Common features regard (ICT League Paper, 2002):

- training of teachers,
- development of educational software and digital content,
- improving the infrastructure, hardware and connectivity of the education sector,
- development of educational nets,
- international co-operation,
- research and development,
- public private partnerships.

According to the EURYDICE's report, a national policy encouraging the use of ICT in education is in operation in all countries of the European Union. This national policy has generally been encapsulated in one or more official documents (law, decree, circular, recommendation, and action plan) (EURYDICE, 2001a).

According to the same report, in all the countries where official documents advocate the use of ICT in teaching, there are one or more national or official bodies that are entrusted with the task of applying them or promoting practical measures and centralizing initiatives (EURYDICE, 2001a).

Pars (1999) stated that Turkey lacks defined information society policies. However, the existence of committees such as the Electronic Commerce Co-ordination Committee and long term infrastructure plans such as TUENA imply that information society issues are given high importance. Similarly, the existence of many ongoing networking, Management Information Systems (MIS) and other Information Systems (IS) projects at many governmental organizations including ministries, educational institutions and administration show that information society projects have a high priority. ICT are identified as one of the high priority areas in research and development.

According to MEB (2001) reports leads to that; the Ministry of National Education of Turkey considers ICT in education policy. It aims to achieve a fast development in the areas of ICT which are of economical and social key importance in the world. Turkey's national policy in relation to ICT is based on keeping pace with the information age, to raise people who think universally and act nationally, to

become a society of information and technology, to support each level of the education system with technology so as to continuously increase the competitive power of our people and today's society. In this sense, the Ministry of National Education of Turkey is making preparations for spreading basic computer training and computer assisted education, parallel to technological developments, for training operational personnel and for building computer laboratories in schools where none exist. Within this framework; a total of 221 thousand teachers have been trained in the use of computers, and primary education inspectors have had an intense inservice training, by using the credit received from the World Bank, 3.188 information technology classrooms have been built in 2.802 schools, and tenders have been opened to build IT classrooms and to obtain software in 3.000 more primary schools in 2001.

Distance education services have given through "open basic education school, open secondary school education, and open vocational and technical school education" to provide equal educational opportunities for every citizen, and to supporting the education given in primary and secondary education institutions. These distance education services have been used by 715.510 students. Preparations have been completed to purchase 45 thousand computers to be used by primary schools' teachers. Tenders shall take place at the beginning of the year 2002. The purpose of these plans is to provide the teachers an opportunity to use computer in teachers' rooms (MEB, 2001).

2.3. ICT in the National Education Projects

As it can be inferred from the European Education systems documents, at the end of the 1970s and start of the 1980s, public initiatives were launched in some countries of the European Union with a view to bringing ICT into education. For most of the time, this meant that it was regarded as a subject for teaching, with an exactly bounded position in the curriculum. During this stage, ICT was not really regarded as an extensively used teaching resource, or as a subject with a significant contribution to make across the curriculum as a whole (EURYDICE, 2001b).

According to the same report, the development of multimedia computers and rising awareness of the potential of ICT as a teaching resource led to the increase of pilot projects and public financial support, particularly for the development of educational software. Meanwhile, the major computer industries were quick to grasp the potential of ICT in terms of educational products and services (EURYDICE, 2001b).

From 1983 beyond, the European Commission acted as a catalyst and gave the lead by encouraging the incorporation of ICT into education and vocational training. For this purpose, it above all lent its support in that period to the organization of seminars, symposia and meetings enabling the Member States to pool their experience. Then, in 1986, the European Community program, COMETT, involving cooperation between universities and firms throughout Europe to develop education and training in technology, was adopted. In 1990, the Community program, Eurotecnet, was also launched for the promotion of innovation in

vocational training to take account of ongoing technological change and its impact on qualifications and employment (EURYDICE, 2001b).

As it is cited in the Educational Software and Multimedia Task Force was established in March 1995 (and continued its activities until 1998) so that six of the EU programs (Socrates, Leonardo da Vinci, Targeted Socio-Economic Research, Esprit, Telematics Applications and Trans-European Telecommunications Networks.) would join forces to speed up the development of educational and training technology and its application throughout the EU. This cooperation led to the organization of a joint call for proposals unlocking a Community contribution of EUR 49 million used to support 46 educational multimedia projects involving over 400 firms and institutions, around half of which were universities (EURYDICE, 2001b).

In Turkey, based on fact that computer can increase quality of instruction, the thought of using computers in Turkish schools goes as far back as 1984. 1988-1989 was the planning and decision making years that yielded to a 500 secondary and vocational schools equipped with a computer laboratory with local area network. In addition 142 tutorials were developed by the firms to be used on the network. The main components of the project were identified as (Yıldırım, 2001):

- preparing and integrating curricula,
- software design and development,
- training of teachers,
- acquiring hardware,

- incentives to produce hardware components locally.

According to research of Pars (1999) in Turkey there have been several ICT projects. One of the projects is to build newer CAI (Computer Aided Instruction) labs or to renew existing ones. Another project's of the Ministry of National Education is to connect all ministerial organizational units at all provinces and to build a Management Information Systems, namely MEBSIS.

MEBSIS major components are Personnel Information System (PERSIS), Budget and Accounting Information System (BUTSIS), and Management Information System for Provincial and District National Education Directorates (ILSIS), which connects administrative units of the ministry at provincial and sub-provincial levels.

> According to reports of MEB, in order to ensure that the education system can achieve its goals, reach its targets and continuously improve it self, efforts shall be made to increase effectiveness in the functioning of management processes and in decision-making mechanisms. Management Information System for Provincial and District National Education Directorates (ILSIS), which is a part of these efforts, is a management information system to be established so that the functions of the Provincial and District National Education Directorates can be executed with support from information technology. The main objective of the information system is;
>
> in the central organization;

- to meet daily, continuous and regular requirements,

- to meet the increasing communication needs between the central and provincial organizations of the Ministry of National Education.

in the provincial organization;

- to ensure that increasing responsibilities are effectively fulfilled and to facilitate complex procedures.

- ILSIS application software consists of 11 different modules. These modules are personnel, appointments, government institutions, statistics, archive-documentation, budget-accounting, accrual, private institutions, inspection-investigation, investments and installations, inventory and movables.

These modules are designed and used so that the work of provincial national education directorates that have priority is done fastly, reliably and simply. When the ILSIS project is implemented, a sound, fast and up-to-date information flow shall be achieved between the central and provincial organizations. To ensure that organization and duties of the Ministry of National Education can meet the education requirements of our day and to make the ideal of a modern, democratic Turkey come true, studies shall be continued concerning the Organization and Duties of the Ministry of National Education Law no 3797 in order to;

- organize the central organization so that it will perform its planning, programming and inspection functions,

- organize the provincial organizations so that it will perform its executive functions,
- it will make the most efficient use of human and material resources
- it will provide fast and correct solutions to problems,
- it will employ qualified personnel to take implementation decisions.

Also, in order to make sure that the inservice training received by teachers and instructors are reflected in their personnel rights and that contracted teachers and instructors are employed where necessary, the related legislation and practices of the EU countries shall be reviewed and teaching personnel shortcomings shall be solved by encouraging people to work as research assistants to become teachers and instructors, financial and legal measures shall be taken and the necessary legal arrangements shall be made (MEB, 2001).

2.4. ICT in the Curriculum

According to reports of EURYDICE, in primary education, ICT is included in the curriculum in many European countries. Conditional on the country concerned, its inclusion is more or less recent. In Ireland, the Netherlands, Austria, Portugal and Iceland, ICT has become a part of the curriculum recently. Elsewhere, plans for its introduction are ongoing and sometimes the focus of experimentation in a limited number of schools (Greece and Luxembourg). In the United Kingdom, ICT has been part of the curriculum in England and Wales since the National Curriculum was first introduced in 1988. In Northern Ireland, it has been a requirement (as an educational

theme woven through the main subjects) since the Northern Ireland Curriculum was implemented following legislation passed in 1989. The curriculum in the Netherlands and in the United Kingdom does not specify the numbers of hours to be devoted to this compulsory subject as the schools are free to decide on the allocation of hours of ICT teaching (EURYDICE, 2001a).

In contrast, according to the same report, ICT is offered as an option in some countries, in some cases only recently (some pre-accession countries). In the case of an elective course, the number of hours to be devoted to it is seldom specified in the curriculum. In other places, plans for its introduction are ongoing and sometimes the focus of experimentation in a limited number of schools (Greece and Luxembourg). In Greece, ICT is not part of the curriculum but the Pedagogical Institute has encouraged its use in a pilot project involving 40 primary schools (EURYDICE, 2000).

According to North Central Regional Educational Laboratory (2003), if technology is to be used to produce improvements in student achievement, teachers must see a direct link between the technology and the curriculum for which they are responsible. Professional development for technology use should demonstrate projects in specific curriculum areas and help teachers integrate technology into the content. In particular, professional development activities should enhance teachers' curriculum, learning, and assessment competencies and skills as well as classroom and instructional management competencies and skills. Specific content can help teachers analyze, synthesize, and structure ideas into projects that they can use in their classrooms.

A good professional development program is job embedded and tied to learning goals: It provides activities in the context of practice. The best integration training for teachers does not simply show them how to add technology to context what they are doing. It helps them learn how to select digital content based on the needs and learning styles of their students, and infuse it into the curriculum rather than making it an end in it (North Central Regional Educational Laboratory, 2003). Knuth, Amenta-Shin, and Ciesemier (1999, p.13) have identified the following curriculum design competency and skills:

- taking responsibility for integrating technology,
- designing curriculum that is standards-based,
- evaluating software and technology application,
- incorporating student technology standards,
- understanding how technology is used in content areas and world,
- applying technology to support gateway content learning,
- applying a systematic instructional design process,
- understanding engaged learning instructional designs (e.g., problem-based learning).

In the USA, National Educational Technology Standards (NETS, 2003) for students were released in 1998, for teachers in 2000, and for administrators (TSSA) in 2001. These standards were taken into consideration in preparing primary and secondary curriculum. At the state level in the USA, 43 of the 51 states have adapted with, or otherwise referenced at least one set of standards in their state technology

plans, certification, licensure, curriculum plans, assessment plans, or other official state documents.

According to Technology Standards for School Administrators Collaborative (2001) educational leaders ensure that curricular design, instructional strategies, and learning environments integrate appropriate technologies to maximize learning and teaching. Also, educational leaders ensure the integration of technology to support productive systems for learning and use technology to plan and implement comprehensive systems of effective assessment and evaluation.

National Educational Technology Standards for Students (NETS, 2003) are important to prepare curriculum or assessment plans. Some of them are as follows:

1. Basic operations and concepts
   - Students demonstrate a sound understanding of the nature and operation of technology systems,
   - Students are proficient in the use of technology,
2. Social, ethical, and human issues
   - Students understand the ethical, cultural, and societal issues related to technology,
   - Students practice responsible use of technology systems, information, and software,
   - Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity,
3. Technology productivity tools

- Students use technology tools to enhance learning, increase productivity, and promote creativity,

- Students use productivity tools to collaborate in constructing technology-enhanced models, prepare publications, and produce other creative works,

4. Technology communications tools

- Students use telecommunications to collaborate, publish, and interact with peers, experts, and other audiences,

- Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences,

5. Technology research tools

- Students use technology to locate, evaluate, and collect information from a variety of sources,

- Students use technology tools to process data and report results,

- Students evaluate and select new information resources and technological innovations based on the appropriateness for specific tasks,

6. Technology problem-solving and decision-making tools

- Students use technology resources for solving problems and making informed decisions,

- Students employ technology in the development of strategies for solving problems in the real world.

In Turkey, ICT is offered as an option. In the case of an elective course, one or two hours to be devoted to it is seldom specified in the curriculum for primary

education. It sometimes depends on the school or students. It varies: one or two hours a week in Turkey (Kocaoluk & Kocaoluk, 2000).

According to the McKinsey report, the important limitation is the restricted practical guidance that teachers receive on how to use ICT in the classroom. All of curriculum requires that ICT be taught as a subject in its own right to all age groups – from ages five to 16 – and that it is used in the teaching of other subjects (McKinsey Report, 1997).

2.5. ICT in the Teacher Education

According to Heinich, Molenda, Russell, and Smaldino (2002) the teacher's role in learning is changing as new technologies appear in the classroom. Teachers are not being replaced by technology, but their role has changed from information presenter to learning resources coordinator. In addition, they serve as facilitator, manager, counselor, and motivator. Their new role frees them to work more independently with individuals and small groups while leaving the formal presentations to another medium. Teachers help students find and process information from many sources. In the future, teachers will become more and more "the guide on the side" rather than "the sage on the stage". The demand for teachers with computer skills is increasing. Some schools now require that potential teachers demonstrate their computer skills. It is not enough to have had a course in college. They must demonstrate to an observer that they can operate a computer and use software for instructional purposes. The trend toward changing teacher certification requirements, primarily to permit knowledgeable laypersons to teach, will probably

be accelerated by the acceptance of courses delivered by technology, the advantages of having a diversely talented staff, and the current shortage of teachers.

Seymour (1993 cited in Yildirim, 2000) defined the technology as the process through which we attempt to expand human potential to improve and control our world. According to Yıldırım, ever since the advent of technology into society and the workplace, educational institutions have struggled with the question of how to teach, given the variety of technologies that are available to enhance human potential and improve teaching. Likewise, teacher education programs have also struggled with the question of how to prepare prospective teachers for the next century. It is clear that in the 21st century; almost all jobs will involve computers in some way. It is crucial for teachers to have appropriate technology training during their preservice education, if they are to meet their students' needs for the next century (Yıldırım, 2000a).

ICT is not only for students; but also for teachers are increasingly using ICT for administrative and professional purposes. Communication by computer between teachers and parents or teacher and school management will probably grow especially by using ICT. Teachers can use provided classroom or lab computers for record keeping, attendance, student information, and to generate reports to parents. In addition, teachers use ICT for their professional use in lesson planning, instruction and communication (Warren, 2000).

The use of technology serves as a perfect example of constancy and change in schools. Changes come and go and many things may remain the same. Since the early

1900's a succession of new technologies entered the classroom with the teacher usually being blamed for their failure to succeed (Milligan 1998).

According to Collins (1996), teacher is the gatekeeper of the innovation and ironically is the key person, who has to use the innovation. The school may have the highest facilities of instructional technologies; the classrooms may be equipped with the newest technologies and wired for the Internet. Regardless of the place or method of instruction, a result that is consistent is that; teachers are the role players in successful or unsuccessful implementations. (cited in Milligan, 1999).

Bone stated that the teacher education systems are almost all undergoing change of some kind at this time, undirected in any international sense but with some identifiably common trends. It is a period of great fluidity, with many difficulties for those engaged in the work but interesting too, and factors responsible for change have tendency to operate in similar, if not exactly the same, directions (cited in Buchberger, 1998).

> Teacher Education in Europe may be called a huge enterprise. Because more than half a million student teachers receive their preservice teacher education and training in more than 1,000 institutions at which more than 50,000 teacher educators and trainers are working. Inservice education and training has to be provided for more than 5 million teachers. Teacher Education in Europe is organized in systems and models of highly heterogeneous natures. There are big differences between the different Countries of the European Union (Buchberger, 1998, p.22).

A research conducted by Larose and et al (1999) summaries, since the second half of the 90s, and particularly since the explosion of accessibility to the network, one notes a rapid development in the scientific literature dealing with the integration of ICT in the preservice curriculum. Although particularly "dynamic" in the Anglo-Saxon world, this literature is emerging in all industrialized countries. Anglo-Saxon world, but now more in Europe than in the US, one finds an abundant literature dealing with the integration of information systems and of computer communication in teacher education.

According to Brummelhus and Plomp (1994), the use of ICT in teacher education exists parallel to the one already reviewed. This literature is linked to a research tradition focusing upon an observed weak transposition of computer literacy acquired during preservice education to the field of practice by young teachers.

Larose and et al (1999) research leads to similar conclusion: regardless of the quality of computer equipment available to teachers in the school environment and independently of the quantities of courses which they have taken during their undergraduate studies, the level of transfer of acquired competencies and learning to practice is very weak.

According to the same research findings, no matter if the discourse and the education are on what was once called "computer assisted education" or on the integration of multimedia technologies, the results are identical. The major impacts of education on the educated remain at the level of the "private" use of these technologies and not in their integration into daily teaching practices.

It is clear that, the role of the teacher have changed, because of ICT. The ICT skills that teachers need for the next century are complex. They are not mere users of IT who can be trained in office applications like employees in some employment sectors. They need to be able to use all the generic packages, plus multimedia applications on CD-ROM, subject-specific software, find suitable resources on the Internet and, crucially, judge when this is appropriate within school work. Moreover, they have to show their pupils how to use the technology to find information from on-line and off-line sources, help develop information-handling skills, communicate with others and create information in digital form (BECTA, 1998).

According to Becta's report, there is much talk of how the role of the teacher should be changing in the digital age from a classically didactic role to one that is more subtle and complex, interacting when appropriate between the learner and the new technologies. For many, however, the role is still essentially the same, although new digital resources are undoubtedly providing access to a potentially enormous wealth of content. Teachers will, therefore, need to guide and coach pupils to navigate, save and interpret material to assist with learning (BECTA, 1998).

While it is easy to over-emphasize the point about the changing role of the teacher, it is hard not to over-emphasize the scale of the challenge facing all national education systems in bringing about the sweeping programs of ICT training needed to help the mass of teachers to enter the digital age. Preservice teacher education and inservice teacher education are used to provide how to integrate ICT into teaching methods.

For preservice teacher training, in some countries, there is a move to make ICT a compulsory part of the teacher's induction course. In France, a two-year emergency program beginning in 1998 placed the focus on showing trainee teachers how to integrate ICT into teaching methods. Of course, simply decreeing that something should happen is no guarantee of real progress. Time, access to technical resources and teacher-training staff with recent relevant experience to pass on to the teachers of tomorrow all appear to be in short supply. This latter expertise is more likely to reside in leading-edge schools than in the universities and colleges that traditionally train young entrants to the profession (BECTA, 1998).

For inservice training, important as preservice training is, the bulk of the teaching force is already in the system and will be there for 15–20 years to come, so inservice training is the biggest challenge. A wide range of methods are used to provide inservice training – both formal and informal. This includes traditional courses, open and distance learning, one-to-one support in the classroom and providing teachers with personal equipment. In many cases, needs are identified locally, and training is arranged locally, although in some countries, there is a tendency to deliver the more advanced pedagogical training nationally and at a distance, using the technology as a medium (BECTA, 1998).

Several teacher training projects in Germany at Länder level and the 'Licence to Run a Computer' qualification in Finland illustrate how successful teacher-training schemes often start with small building blocks of competence to break down 'techno-fear'. Training needs to be customized to teachers' level of skill. Pre-sifting of teachers for training so that they are at the right level contributes to success. In

Portugal, the Minerva project which ran from 1985 until 1994 established a teacher-training tradition which led to many informal sessions in schools. These were formative first steps for many teachers (BECTA, 1998).

In Finland, a rolling program of training will see 9,000 teachers (10% of the workforce) trained in ICT pedagogy over a total of five weeks on a course with 7–10 days of direct tuition followed by distance training and private study. The National Board of Education purchases the training from universities with faculties of education (12 in number) and offers it free of charge to teachers. Only those with a 'computer licence' – a vocational certification of basic competence – are accepted. By 1998, 5,500 teachers had started the course. Trials are also taking place in Finland with students receiving bursaries to train teachers in ICT. Seventy bursaries were awarded in 1997. In Denmark, the Danish National Centre for Technology Supported Learning (CTU) focuses on teacher training, with programs for teachers (BECTA, 1998).

According to Dawes (1999) the current role of the teacher is much more than that of a provider of information: one crucial aspect is the establishment of relationships to ascertain and address learning needs. ICT can support this role but may not necessarily supplant it. Teachers are also commonly represented as having a fear of technology: the reality may be that anyone would be fearful of placing reliance on the sort of computers universally found in schools. Teachers may require a productive purpose for ICT use. The marketing and presentation of computers as `edutainment', and the commonly stated perception that one `plays' on computers may not appeal to some.

Davenport (1995) suggests that technology courses should be a model of real classrooms. According to the author; the first and inevitable requirement for the successful implementation of the use of technology is the training of teachers at all levels, mainly at their pre-service education. Teaching them learn to use technology in later years proved difficult for several reasons. For instance teachers were "afraid" of the new and unknown. The second inevitable requirement for the successful implementation of the uses of technology is that, the uses of technology be modeled for the pre- service teachers and that they are trained to use it when they become full time classroom teachers.

In Turkey, considering also need for teachers occurred as a result of the execution of the law on Eight-Year Continuous Compulsory Education No. 4306 teacher training programs regarding the training of the teachers to be required in the long term and short term at primary and secondary education institutions have been rearranged through cooperation between the Ministry of National Education and Higher Education Council (YOK), which is responsible for the planning, coordination, and supervision of higher education in Turkey. Parallels the international practices in reforming preservise teacher education for the new millennium; the Higher Education Council developed a new curriculum for the schools of education of Turkey. According to the new curriculum, "Computer Applications in Education" and "Instructional Material Development" courses became must courses for all preservice teachers to fulfill the requirements for teaching credential (Yıldırım, 2001).

In Turkey, the Ministry of National Education has been organized inservice training activities in collaboration with related institutions and organizations in order to increase the quality and effectiveness of education. In this context, a total of 221 thousand teachers have been trained in the use of computers, and primary education inspectors have had an intense inservice training (MEB, 2001).

There are five stages of teacher technology adoption in teacher technology training (CEO Forum, 1999):

Stage 1 Entry: At this stage, teachers are not themselves the technology users. If students are using technology, they are using it in ways determined by someone other than the teacher and without participation from the teacher. For example, they may have a designated computer lab time taught by a computer teacher. Alternatively, they may have classroom computers that are used for educational software games which students independently use during assigned computer time.

Stage 2 Adoption: Teachers are beginning to use technology usually to enhance their own productivity, mandated either by the school or through their own initiative. Teachers at this stage use technology in a limited way, to do things they already would have done without the technology. They experience an advantage doing traditional tasks with a new tool and begin to see the power of the tool for other applications. For example, a teacher who uses word processing software to prepare a newsletter to parents discovers how much easier it is than using a typewriter. Therefore, the teacher begins to

provide opportunities for students to use the computer as a "better typewriter" for completing stories, reports.

Stage 3 Adaptation: Teachers begin to use technology in ways that are connected to the curriculum, and in ways that are already familiar. Teachers are automating existing practices. For example, a teacher who has located web sites with reference material relevant to a particular lesson is using that material to present the subject matter to the class. Perhaps the teacher is having students use CD-ROM encyclopedias and the Internet as an extension of print resources. Teachers at the adaptation stage tend to direct student inquiry (e.g., pre-selecting web sites) rather than allowing student-directed learning experiences.

Stage 4 Appropriation: Teachers at the appropriation stage view technology as a relevant tool for teaching and learning and they design learning experiences and environments to take advantage of its capabilities to meet objectives For example, a student assigned a project on a local environmental issue would be empowered to use the Internet and other technology resources, such as e-mail, to direct a personal approach to the project. The teacher might also allow students to determine individual presentation tools, and arrange for a presentation to the appropriate community organization.

Stage 5 Invention: At this stage, teachers are redefining classroom environments and creating learning experiences that truly leverage the power

of technology to involve students in tasks that require higher order thinking skills as well as mastering basic concepts and skills. For example, a teacher might create a theme or project around which to center most of the activities of the class for a semester. During that time, the teacher and students would create a project or series of projects that weave learning and demonstration ability in each of the required subject areas.

As mentioned above utilizing from technology is not an easy and short process. Technology courses at preservice and inservice teacher training programs are designed to facilitate teachers' use of technology.

The ISTE, NETS for teachers, which focus on preservice teacher education, define the fundamental concepts, knowledge, skills and attitudes for applying technology in educational settings. All teacher candidates seeking certification or endorsements in teacher preparation should meet these educational technology standards. It is the responsibility of faculties across the universities and at cooperating schools to provide opportunities for teacher candidates to meet these standards listed below (NETS, 2003):

1. Technology Operations and Concepts: Teachers demonstrate a sound understanding of technology operations and concepts.

2. Planning and Designing Learning Environments and Experiences: Teachers plan and design effective learning environments and experiences supported by technology.

3. Teaching, Learning, and the Curriculum: Teachers implement curriculum plans that include methods and strategies for applying technology to maximize student learning.

4. Assessment and Evaluation: Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies.

5. Productivity and Professional Practice: Teachers use technology to enhance their productivity and professional practice.

6. Social, Ethical, Legal, and Human Issues: Teachers understand the social, ethical, legal, and human issues surrounding the use of technology in PK-12 schools and apply those principles in practice.

Studies discussed above show that ICT have critical roles in education. Some of them are as a tool to help create equal opportunities, as a catalyst for change, and as a means to improve the quality of learning. So, the European Union and Turkey have, in the late 1990s, developed plans to intensify their investments regarding ICT in education in terms of education policies, projects, curricula and teacher education programs.

CHAPTER 3

METHODOLOGY

The research and procedure used in this study are presented in this chapter, which includes research questions, design of the study, procedures of the study, data sources, analysis of data, and limitations of the study.

3.1. Research Question

The main purpose of this study is to reveal the differences and similarities between the EU countries and Turkey's educational system in terms of national education policies, curricula and teacher education in terms of the integration of information and communication technologies. This study attempts to answer the following research question:

What are the similarities and differences between the European Union countries' and Turkey's education systems pertaining to the national education policies, curricula and teacher education in terms of the integration of information and communication technologies?

3.1.1. Sub - Questions

1. What are the national policies of the European Union countries' and Turkey's integration of ICT to their educational systems?

2. What are the national projects of the EU countries and Turkey in terms of the integration of ICT to their educational systems?

3. How are the budgets allocated for equipments (hardware and software) and human resources in the EU countries and Turkey?

4. How is the inclusion of ICT in primary and secondary education curriculum in the European Union and Turkey?

5. How is ICT integrated in teacher education programs in the EU countries and Turkey?

   5.1. How is ICT integrated to preservice teacher education programs in the EU countries and Turkey?

   5.2. How is ICT integrated to inservice teacher education programs in the EU countries and Turkey?

3.2. Design of the Study

The main purpose of this study is to reveal the differences and similarities between the EU countries and Turkey's educational system in terms of integration of ICT into national education policies, curricula and teacher education programs. Since

this study mainly compares the integration of ICT into educational systems of the EU countries and Turkey; it was developed as a comparative study.

In order to guide the study and compare the EU countries and Turkey in terms of integration of ICT, the following main themes related to the research questions were determined. The data was collected from existent resources and was compared to each other in terms of five categories which constituted the research questions.

- national or official bodies,
- responsibility for the purchase and maintenance of hardware,
- the number of pupils per computer,
- aims of the projects,
- computer and the Internet use of primary school teachers,
- ICT in primary education: is it a tool or aim?
- curricular objectives of ICT at primary level,
- ICT in the secondary education curriculum as compulsory,
- computer and the Internet use of secondary school teachers,
- reasons given for not using the Internet and computers by teachers,
- ICT as a separate subject in curriculum at secondary level,
- the range of curricular objectives of ICT at secondary level,
- specialization of teachers in ICT,
- preservice teacher training,
- official recommendations for ICT teaching in countries,
- inservice training,

- official ICT training courses given to teachers,
- providing teachers with equipment.

3.3. Procedures of the Study

The primary data for the study were gathered from the official documents. In this study, the following countries were examined: Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Luxembourg, Netherlands, Austria, Portugal, Finland, Sweden, United Kingdom, which are the members the European Union, and Turkey which is in the process of joining the European Union. First of all, the data related to these countries were gathered. After that, the official documents, reports, articles and the other related data were organized with in the five categories which constituted the research questions, and themes. Finally, the categorized data were compared.

The particular interest of the study lies in this comparison, as a result of which a very wide range of different statistical and qualitative indicators are combined in a single study.

3.4. Data Sources

The data related to this study was gathered from Eurydice, the Information Network in Education in Europe, Eurostat, the Statistical Office of the European Communities, Becta, European Commission, and the Turkey's Minister of National Education.

The official documents related to the European Union's data were gathered via official web page and libraries. Turkey's data was gathered from official documents of Minister of National Education, official web page and libraries.

3.5. Data Analysis

The data gathered from the data sources was analyzed through a comparative study. There were differences and similarities between the EU and Turkey pertaining to the national education policies, curricula and teacher education for the integration of ICT.

The collected data is analyzed considering the five main categories below:

- policies,
- specific projects,
- financial issues,
- curriculum issues,
- teacher education.

In the analysis of the data MS Word and MS Excel were used. Each research question was analyzed one by one. The data of the EU and Turkey collected was analyzed in the order of research questions. Consequently, analyzed data of the EU and Turkey was compared in terms of integration of ICT into education systems.

3.6. Limitations of the Study

The following limitations are relevant to the study:

1. This study is limited by only reached sources of information for the comparative literature.
2. This study is limited to secondary sources, which were not a direct witness to an event.
3. The scope of the study is too wide, so it limited the researcher. The 16 countries, namely the 15 EU Member States, and Turkey constitute the scope of this study.
4. The study is limited to: "national education policies, national projects, budgets, curricula and teacher education for the integration of ICT".
5. The study is limited to the inclusion and use of ICT in the curriculum in primary and secondary education.

CHAPTER 4

RESULTS

This chapter presents the findings of the study concerning research question and each sub-questions stated formerly. The focus of this study is to reveal the differences and similarities between the EU countries' and Turkey's educational systems in terms of integration of ICT into national education policies, curricula and teacher education programs.

The EU countries and Turkey have similar characteristics; however, it is clear that many characteristics of the EU countries and Turkey are different in terms of demographic and geographical settings, economic conditions, and educational systems. Before presenting the results of this study, it is better to clarify the characteristic of the EU countries and Turkey in regard to demographic and geographical settings, economic conditions, and educational systems.

Demographic and Geographical Settings: The European Union consists of 15 countries and the total land area is 3.193.000 km^2 and the population estimate is

379.448.000 people. Turkey's land area is 770. 000 km^2 and the population estimate is 65.300.000 people. Turkey has a land area which is larger than that of each of the 15 the EU member countries where its population is also higher than those countries but Germany (see table 4.1).

Economic Conditions: When economy is concerned there are considerable differences between Turkey and the EU countries. The average of Gross National Income Per Capita (GNP) in the EU member countries is 24.463 € where it is only 3.200 € in Turkey. Besides, the PC distribution in Turkey is about 32 PCs per 1000 people where this ratio is 278 PCs per 1000 people in the EU member countries. The average number of subscriptions for the Internet in the EU member countries is 299 per 1000 people, and on the other side Turkey's average is 25 per 1000 people (see table 4.1).

Educational Systems: In Turkey, there are 12.339.254 students and 511.062 teachers in primary and secondary schools. In the EU countries, the number of students is 60.802.600, and it is 4.501.500 for teachers. In Turkey there are 24 students for each teacher while there are 13 students for each teacher in the EU countries. The average of the pupils for per computer at primary education in the EU is 13.2. However, the average of the pupils for per computer at primary education in Turkey is 103.5. For secondary education in the EU countries the average is 8.6 where it is 35.2 in Turkey (see table 4.1).

The data presented in table 4.1 shows that Turkey faces great educational challenges with great numbers of people to educate, great land area, a very large

educational system, poor economic situation, inadequate technologies, and mass numbers of students and teachers. While examining the results of this study, conditions of Turkey and the EU countries should also be considered.

Countries	Land Area[1] (1000 km²)	Population[1] (2001)	Gross National Income Per Capita[1] (€) (2000)	The number of Computers per 1000 People[1] (1999)	The Number of the Internet per 1000 People[1] (2000)	The Number of Students in Primary & Secondary Education[2] (2000)	The Number of Teachers in Primary & Secondary Education[2] (2000)	Pupils per Computer at Primary Education[3]	Pupils per Computer at Secondary Education[3]
Total or Average of the EU	**3,193,000**	**379,448,000**	**24,463**	**278**	**299**	**60,802,600**	**4,501,500**	**13.2**	**8.6**
Austria	84,000	8,140,000	25,260	260	333	1,136,500	101,500	8.9	8.5
Belgium	31,000	10,292,000	24,220	313	283	1,831,300	192,700	11	8
Denmark	43,000	5,367,000	32,580	414	484	810,300	82,500	4.2	1.5
Finland	338,000	5,195,000	25,350	360	445	878,500	62,000	7.5	6.8
France	544,000	59,343,000	23,250	220	169	9,813,300	709,100	14.1	9.4
Germany	357,000	82,360,000	24,640	297	296	11,963,100	817,600	19.2	13.7
Greece	132,000	10,596,000	11,650	61	95	1,384,100	123,800	29.4	15.2
Ireland	69,000	3,873,000	27,320	321	275	787,900	47,700	11.6	8.3
Italy	301,000	58,018,000	20,190	191	233	7,240,700	680,100	20.8	8.9
Luxembourg	3,000	447,000	46,590	396	275	57,400	5,000	2	6.3
Netherlands	41,000	16,101,000	25,190	362	459	2,657,800	227,600	8.3	9.1
Portugal	92,000	10,303,000	11,510	93	100	1,642,200	152,700	17	16.4
Spain	505,000	40,428,000	15,220	122	139	5,939,600	459,800	11.2	12.4
Sweden	411,000	8,910,000	28,010	452	564	1,729,500	129,400	9.7	4.1
The United Kingdom	242,000	60,075,000	25,970	304	335	12,930,400	710,000	11.8	6.4
Turkey	**770,000**	**65,300,000**	**3,200**	**32**	**25**	**[4] 12.339.254**	**[4] 511.062**	**[5] 103,5**	**[5] 35,2**

[1] From ABGS, 2002

[2] From EUROPEAN COMMISSION / EURYDICE / EUROSTAT, 2003

[3] From EURYDICE, 2001a

[4] From MEB, 2003

[5] From MEB, 2002b

4.1. Policies Regarding the Integration of ICT to Education

In this part, the information on national or official bodies, responsibility for the purchase and maintenance of hardware, the number of pupils per computer in regard to the EU countries and Turkey was provided.

National or Official Bodies: In most of the European Union Countries, ICT in education policies comes from central government ministries of education, while in others (Netherlands, Belgium, Denmark, and Germany) where there is much more regional autonomy, the role of central government is to provide guidance and to give advice. In some instances, the policy making process is fully devolved to regional state authorities, as is the case with the German federal states. The implementation of policies usually relies on three mechanisms (BECTA, 1998):

1. **Legislation:** The use of legislation and regulations is still important as a basic strategic instrument in countries, but it is widely recognized in the middle of de-centralized systems. The concept must be only the starting point providing a framework on which to build, rather than a strict directive.

2. **Funding Incentives:** Whereas the responsibility for overall policy development may rest with central government, the means of making that a reality through funding and administration of specific parts of the school system are devolved by local or regional authorities. Where priorities for school management are decided locally, it is harder for central government to use funding as a direct lever to drive through change on a national scale.

3. Information: Seminars, conferences and the publication of case studies, good practice guides and support materials are increasingly being used to help implement policy change in this area. The intention is to support decision makers at local, regional and institutional level to implement ICT effectively within a school, based upon impartial advice and information.

The number of such bodies varies from country to country (see table 4.2), but their duties and responsibilities normally include some or all of the following (EURYDICE, 2000):

- define the objectives to be pursued,
- select and supply the hardware and the software,
- organize teacher education and the development of new software,
- monitor and coordinate the various initiatives implemented in this area,
- responsible for the application of the decisions taken and the agreements concluded,
- collect information to assess the impact of the projects and programs set in place.

In Turkey, the authorized institution about this subject is General Directorate of Educational Technologies (EGITEK). This institution was established in 1998 by the unification of the General Directorate of Computer Education and Services and the Center for Education through Films, Radio and Television. EGITEK, carries on its services through the Department of Management of Revolving Funds as well as

through general budget allocations. Functions of the General Directorate of Educational Technologies:

- EGITEK conducts research, project, development, follow up, and assessment and evaluation studies to support education with technological developments, and to plan for extensive usage of technology in education.
- EGITEK offers educational opportunities throughout the country and in some international centers via distance education.
- EGITEK produces or purchases visual, auditory, printed and computer based educational materials required by formal, informal and distance education, after the evaluation of the related material.
- Formal and non-formal placement examinations and completion examinations that are administered by central system are planned, implemented and evaluated by EGITEK
- It administers the information processing activities of the Ministry's central and provincial organizational units. EGITEK, also, carries out the appointment of teachers by using the computer systems. It establishes computer laboratories in schools, trains the related personnel, and offers maintenance services. It administers the Integrated Management Information System of the Ministry of National Education (MEBSIS). It administers (ILSIS), the Information Management System, which is established for the purpose of providing continuity of the functions of District and Provincial National Education Directorates with information technology support and to provide for their communication with the

Ministry. It carries out the Internet services of EGITEK and of the Ministry. It prepares Websites for publication and conducts updates. With the Project Based Collaborative Learning on the Internet (World Links), it aims to develop common learning methods; and to carry out student-centered, project-based, collaborative learning activities by getting teachers and students of various countries together on the Internet.

- EGITEK establishes Information Technology Classrooms in primary schools as an extension of the Primary Education Project. In these schools, where the Internet connections are available, there are TVs, overhead projectors, videos, printers, and computers for students, teachers and administrators.
- EGITEK offers an information house, namely, the Information Center that is in service of everyone, who wants to access information. The Information Center offers services of providing books, periodicals, photographs, videotapes, audiotapes, filmstrips, transparencies, CDs, CD-ROMs, VCDs, DVDs and the opportunity of accessing information resources through catalogue searches on the Internet.

Table 4.2: National or Official Bodies with a Remit for Supervision and Promotion of National Policy for ICT in Education, (EURYDICE, 2000).

Countries	Official Bodies Responsible for Supervising and Promotional National Policy
Belgium (fr)	Ministry of the French Community, and the Regions of Wallonia and Brussels-Capital Region
Belgium (de)	Ministry: Organisation of the Unterrichtswesens
Belgium (nl)	Departement Onderwijs (Department of Education) Afdeling Beleidscoördinatie (Policy Co-ordination Division)
Denmark	Undervisningsministeriet & UNI*C & Learning Lab Denmark
Germany	Kultusministerien / Wissenschaftsministerien (Länder) Bundesministerium für Bildung und Forschung (Bund)
Greece	Armodies Ypiresies YPEPTH & Pedagogiko Instituto Erevnitiko Akademaiko Instituto Technologias Ypologiston (EAITY) Tmimata Anotaton Ekpaideftikon Idrymaton & Instituto Epexergasias Logou Diefthinseis Protovathmias kai Defterovathmias Ekpaidefsis Nomon Periferiaka Epimorfotika Kentra
Spain	Centro Nacional de Información y Comunicación Educativa (CNICE) Programa de Nuevas Tecnologías de la Educación de Canarias Xarxa Telemática Educativa de Catalunya & Centro Multimedia de Galicia Red telematica Educativa de Andalucia, etc.
France	Ministère de l.éducation nationale & Rectorats Ministère de la recherche (Direction de la technologie)
Ireland	Department of Education and Science - National Centre for Technology in Education National Council for Curriculum Assessment (NCCA)
Italy	Ministero della Pubblica Istruzione Ministero dell.Università e della Ricerca Scientifica e Tecnologica
Luxembourg	Centre de technologie de l.éducation - CTE Service de Coordination de la Recherche et de l.Innovation pédagogiques et technologiques (SCRIPT)
Netherland	Ministerie van Onderwijs, Cultuur en Wetenschappen (ICT department for policy development, co-ordination and funding) Kennisnet (organisation of the educational portal site and network) Surfnet (organisation of the educational network for higher education) ICT Foundation for schools Expertise Centre (support for the development of educational multimedia projects) Pedagogical Centre & Dutch education inspectorate (management and development of ICT policy)
Austria	Bundesministerium für Bildung, Wissenchaft und kulturelle Angelegenheiten Landesschulräte / Bezirksschulräte / Schulleiter
Portugal	Programme Nonio . Seculo XXI, ICT Programme for Schools (Ministry of Education) Coordination Group for programmes to introduce and extend ICT and provide training in this field at the Ministry of Education Internet na Escola, Programme for School Computer Networks (Ministry of Science and Technology) Operational Programme for the Information Society (Ministry of Science and Technology)
Finland	Opetusministeriö . Undervisningsminsteriet (Ministry of Education) Opetushallitus . Utbildningsstyrelsen (National Board of Education)
Sweden	Statens skolverk (National Agency for Education) & ITiS (the ICT school delegation)
The United Kingdom (E/W/NI)	British Educational Communications and Technology Agency - Becta Local Education Authorities (E/W) & Education Technology Strategic Management Group (NI) Education and Library Boards (NI) & New Opportunities Fund Teacher Training Agency TTA (E) & Department for Education and Skills (England) National Assembly for Wales Education Department (Wales) Department of Education (Northern Ireland) & Joint Information Systems Committee
UK (Scotland)	Learning and Teaching Scotland & Joint Information Systems Committee Scottish Executive Education Department & New Opportunities Fund
Turkey	General Directorate of Educational Technologies (EGITEK)

Responsibility for the Purchase and Maintenance of Hardware: In some European Union countries (Austria, Belgium) this function is undertaken by the local authority and at school level. For example, in the Flemish Community of Belgium and in upper secondary education in Austria, it is the local authority that handles the purchase and maintenance of hardware. In the Flemish Community of Belgium, the ministry defines the framework and provides the additional finance available for infrastructure. The schools decide how to allocate the money between the purchase of hardware and software and inservice training (EURYDICE, 2001a).

On the other hand, in most European Union Countries (Denmark, Germany, Greece, Spain, France, Austria, Ireland, Italy, Luxemburg, Netherlands, Portugal, Finland, Sweden, and the United Kingdom) depending on the level of education and on the type of expenditure (purchase of hardware, software, and maintenance of equipment) the responsibilities differ and are sometimes shared by various levels of authority. Austria is an interesting example from this point of view; in primary education, responsibility for purchasing and maintenance is assumed by different levels of authority; in lower secondary education, this is the local level; in upper secondary education, the ministry is responsible for school equipment. Another interesting example is Luxembourg: In the case of primary education, the municipalities are responsible for the purchase of computer equipment and facilities and their maintenance. As far as secondary education is concerned, the Ministry of Education is entirely responsible for these tasks, with the support of a specialized department, the Centre for Educational Technology. This Centre also offers some support at primary level (EURYDICE, 2001a).

In Turkey, all the responsibility for the purchase and maintenance of equipment rests at one level of authority which is the Ministry of National Education. On the other hand, some schools have revolving funds; machines, equipment, tools, etc. that are urgently needed and cannot be provided from elsewhere are purchased at the expense of these revolving funds. Purchasing such urgent needs using the revolving fund is a great contribution for the schools. The workshop capacity, machine parks and technical labor potential in the schools contribute to production through the channel of revolving fund operations.

The Number of Pupils per Computer: The great majority of primary and secondary schools in the EU countries have computer facilities. While some computers are used for administrative and management purposes, others are used for educational purposes. However, when school administrators indicate the quantity of computers which are used for educational purposes in their school, they do not state whether this means that teachers use them to prepare their lessons or actually use them with their pupils in the classroom (see table 4.3).

When the numbers of pupils per computer are compared with, the number of pupils per computer connected to the Internet at primary level in the European Union countries; as shown in table 4.3, number of the pupils per computer connected to the Internet is significantly greater than the number of pupils per computer. When computers connected to the Internet are only taken into account, the number of pupils per computer rises significantly in many countries, and doubles on average.

Table 4.3: Number of Pupils per Computer and Number of Pupils per Computer with an Internet Connection at Primary Education Level (EURYDICE, 2001a; MEB, 2002b).

Countries	Pupils per Computer	Pupils per Computer Connected to the Internet
The European Union	**13.2**	**32.9**
Belgium	11	32.5
Denmark	4.2	5
Germany	19.2	52.3
Greece	29.4	80.6
Spain	11.2	30
France	14.1	43.9
Ireland	11.6	30.1
Italy	20.8	55.1
Luxembourg	2	5.1
Netherlands	8.3	43.2
Austria	8.9	31.8
Portugal	17	36.3
Finland	7.5	11.9
Sweden	9.7	13.4
The United Kingdom	11.8	23.5
Turkey	**103.5**	**2367.5**

In the Netherlands and Austria, this Internet link related increase in the number of pupils per computer is significantly higher at primary education level. On the contrary, in Denmark, Finland and Sweden, the corresponding increase is modest. The countries in which primary schools are especially well equipped with computer facilities, whether in terms of computers themselves or the Internet connections, are Denmark, Luxembourg and Finland. On the other hand, in Germany, Greece and

Italy, the number of pupils per computer, with or without an Internet connection, is high among the European Union countries average: it varies from 50 to 80 pupils per computer when there is an Internet connection and 20-30 pupils per computer as a whole (see table 4.3). In calculating the number of pupils per computer, only schools where computers are used for educational purposes are taken into account. On the other hand, in Turkey, the number of pupils per computer is 103.5 and number of pupils per computer with an Internet connection is 2367.5 at primary education level (EURYDICE, 2001a, p.7).

Otherwise, secondary schools are better equipped with computer facilities at the EU countries. The number of pupils per computer in secondary schools (with or without an Internet connection) is nearly lower than the number of pupils in primary education. Pupil/computer ratios are especially low in Denmark and Sweden; however, they are above the European average in Greece, Spain and Portugal (see table 4.4).

Table 4.4: Number of Pupils per Computer and Number of Pupils per Computer with an Internet Connection at Secondary Education Level (EURYDICE, 2001a; MEB, 2002b).

Countries	Pupils per Computer	Pupils per Computer Connected to the Internet
The European Union	**8.6**	**14.9**
Belgium	8	14.2
Denmark	1.5	2
Germany	13.7	22
Greece	15.2	39.5
Spain	12.4	25.3
France	9.4	21.4
Ireland	8.3	13.1
Italy	8.9	18.9
Luxembourg	6.3	6.7
Netherlands	9.1	15.4
Austria	8.5	10.5
Portugal	16.4	36.9
Finland	6.8	7.5
Sweden	4.1	4.8
The United Kingdom	6.4	8.9
Turkey	**35.2**	**1020.1**

Differences between the ratios that are dependent on the existence of the Internet connections are less marked than in primary education. When computers are used for educational purposes, they are often connected to the Internet. This applies particularly to Luxembourg, Finland and Sweden, and to a lesser extent to Denmark, Austria and the United Kingdom (EURYDICE, 2001a).

4.2. Specific Projects Regarding the Integration of ICT to Education

National projects for the introduction of technology are on the increase. A lot of projects aimed at introducing ICT into primary and secondary education have been initiated in all countries of the EU. Some projects are national, some projects are regional. For example, in Spain, plans are being developed through the Centro Nacional de Informacion Comunicacion Educativa (CNICE), directly run by the ministry, and the different autonomous communities, covering three levels of education (primary, lower and upper secondary). Particularly, in Finland and Sweden plans are being developed by local initiatives (EURYDICE, 2000).

The table clearly indicated that the most long-standing initiatives were launched in the 1980s, and only rarely involved all levels of the education (see table 4.5). Luxembourg is the first country in the European Union countries in terms of starting information and communication technologies projects at upper secondary education level. After Luxembourg, Spain was launched national projects at all three levels of education in 1985 and France was too. In Turkey, national projects for the introduction of technology were started in 1984 at secondary education level.

Table 4.5: Implementation Schedule for Typical ICT Projects at Primary and Secondary Education Levels in the EU Countries and Turkey (EURYDICE, 2000; MEB, 2002d).

Countries	Education Levels	Implementation Period
Belgium (fr), (de), (nl)	Primary	1998-2002
	Lower Secondary	1998-2001
	Upper Secondary	1998-2000
Denmark	Primary	1994-2001
	Secondary	1994-2001
Germany	Primary	1995-2000
	Secondary	1995-2000
Greece	Primary	1998-2000
	Secondary	1998-2000
Spain	Primary	1985-2000
	Secondary	1985-2000
France	Primary	1985-2000
	Secondary	1985-2000
Ireland	Primary	1998-2000
	Secondary	1998-2000
Italy	Primary	1997-2000
	Secondary	1997-2000
Luxemburg	Primary	1990-2000
	Lower Secondary	1985-2000
	Upper Secondary	1983-2000
Netherlands	Primary	1997-2003
	Secondary	1997-2003
Austria	Primary	1997-2000
	Lower Secondary	1989-2000
	Upper Secondary	1985-2000
Portugal	Primary	1997-2000
	Secondary	1997-2000
Finland	Primary	1996-2004
	Secondary	1996-2004
Sweden	Primary	1995-2002
	Secondary	1995-2002
The United Kingdom	Primary	1998-2002
	Upper Secondary	1998-2002
Turkey	**Primary**	**1998-2002**
	Secondary	**1984-2002**

The European Union considerable projects at primary and secondary levels of education generally started after 1995 (see table 4.5). Several initiatives were launched between 1999 and 2001. Greece, in upper secondary education, took up a new project in 2000. Projects got under way in 2001 in Italy, at primary and upper secondary levels. Many of these initiatives are either short term (up to three years), or for an indefinite period and are granted a new budget every year (Spain and France). However, some countries have undertaken long-term projects lasting up to nine years (Portugal). Plans for most projects extend up to 2003 (EURYDICE, 2001a).

Implementation schedule for typical ICT projects at primary and secondary education levels in Turkey started in 1984 (see table 4.5). The number of these projects increased since 1998. For instances, 1st phase of the basic education program started in 1998. The scope of the 1st phase of the basic education program's objective was to build information technology classrooms in at least 2 primary education schools in 80 cities and every town, and the identified schools were grouped according to number of students. In that context, 2.834 information technology classrooms have been scheduled to be built in 2.451 primary education schools all over the country. This number has been increased to 2.802 with 351 newly constructed schools (see table 4.6). Establishment of information technology classrooms in these schools has been completed in all cities and towns (MEB, 2001).

The computer hardware in the information technology classrooms of the primary education schools has been purchased through the international tender held on April 15th 1999 and educational software on December 2nd 1998. Installation of

hardware and software in the information technology classrooms in 2.802 primary education schools has been completed and the said schools are ready for computer assisted education / learning. Also "Microsoft Office 2000" software has been purchased and distributed to all student computers in 2.802 primary education schools. In the information technology classrooms in primary education schools, there are computers, printers, scanners, education software, educational games, electronic references, videos, overhead projectors, televisions, educational video cassettes, transparency, office software and software for computer literacy (MEB, 2001).

Besides the computer hardware and education software for the information technology classrooms in 2.802 primary education schools, 3.041 televisions and 4.740 overhead projectors have been purchased through international tender on December 8th 1998. These audio-visual teaching materials have been distributed to the information technology classrooms in 2.802 primary education schools (MEB, 2001).

In addition, work has begun to establish information technology classrooms in 3.000 more primary education schools, following the previous 2.802. In that context, an international tender has been opened on December 11th 2000 to purchase audio-visual teaching materials for the 3.000 primary education schools. The tender includes TV, video, overhead projector and acetates and videocassettes. With this tender, audio-visual teaching materials have been purchased for the 3.000 primary education schools and videos have been provided for the 2.802 primary education schools that had been equipped with computer hardware, education software, TV's

and overhead projectors before. The audio-visual teaching materials that have been purchased and distributed are as follows (MEB, 2001):

- televisions for 3.462 primary education schools,
- videos for 6.179 primary education schools,
- overhead projector for 3.462 primary education schools,
- reproduction of VHS video cassettes in the subjects of Science, Mathematics, Turkish, Social Sciences, Art, Music and Natural Science and Social Studies for 6.255 primary education schools,
- overhead projector acetates in the subjects of Social Sciences, Mathematics, Natural Science and Social Studies and Turkish History for 6.254 primary education schools.

Table 4.6: ICT Projects in Turkey (MEB, 2001; MEB, 2002a).

ICT Projects in TURKEY			
Name of the Project	**Related Institution**	**From / to**	**Objective**
ILSIS (Provincial National Education Directorates Management Information System)	The Ministry of National Education-World Bank	1995-	Establishing the information management system for provincial national education directorates
MEBSIS Management Information Systems	EGITEK	1998-2005	Providing easy access to the Ministry of National Education information for teachers-students-directors and other citizens
World Links for Development	EGITEK	1998-2005	Ensuring international information sharing and cultural interaction among 15 countries including Turkey, using an Internet-based model named "a project based learning model"
Inspection Committee Modernization Project	Inspection Committee	1999-2002	Updating according to the needs of the information age and fast development, with all needs met
Vocation acquisition through open education	EGITEK	1999-2001	Providing vocational training for citizens in several areas through remote education, and face to face education when needed
Ministry of National Education Information Access Center	EGITEK	2000-2002	Establishing an information access system and center
Ministry of National Education Numerical Archive	EGITEK	2001-2004	Establishing the systems needed to digitalize the audio-visual material archive, performing the digitalization, ensuring that resources are accessible from the Information Access Center
Ministry of Education Cyber education library	EGITEK	2002-2003	Using the Information Access Center resources to prepare education software for ensuring coverage of course books in line with teachers' and students' needs

Aims of the Projects: Objectives have been set in all existing projects. Six categories have been defined:

1. equipment,
2. the acquisition of software,
3. the construction of software,
4. the skills of teachers,
5. the skills of pupils,
6. use of the Internet.

In the majority European Union countries and Turkey stated objectives cover the six categories. But some of the counties in the EU (Denmark, Austria, Finland, and French Community of Belgium) have not set objectives for the acquisition software, and the construction of software. Nearly all countries aim to enhance the equipment and facilities of their schools (except Denmark and Austria). In addition, they attach the priority to the practical integration of ICT in education. For example, reflected in teacher training, development of the skills of pupils and the use of educational software (see table 4.7 and 4.8).

Table 4.7: Objectives in ICT Projects at Primary Education Level in the EU Countries and Turkey (EURYDICE, 2001a; MEB, 2001; MEB, 2002a).

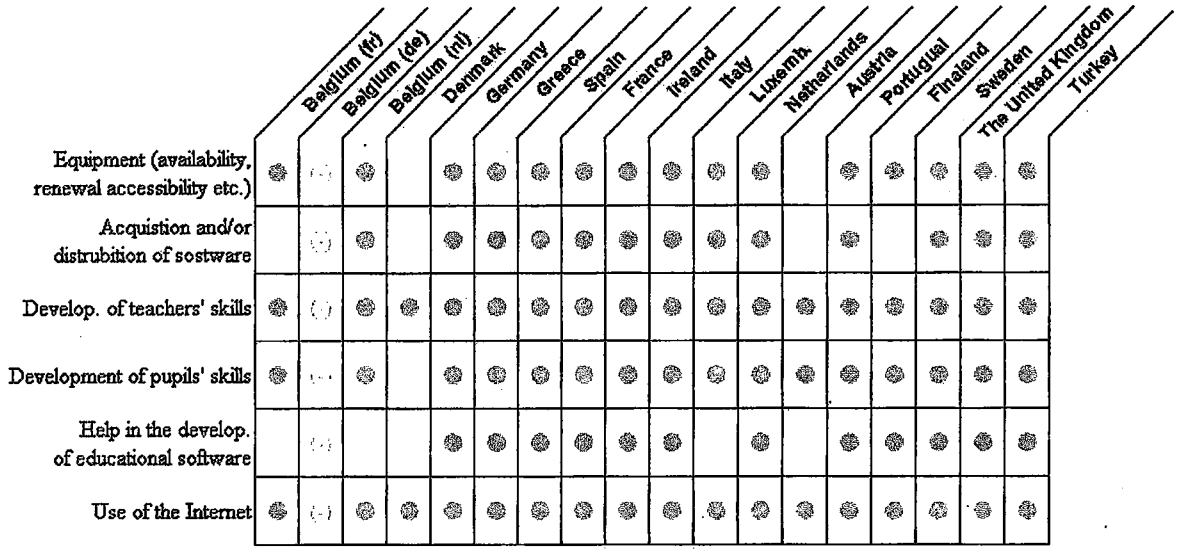
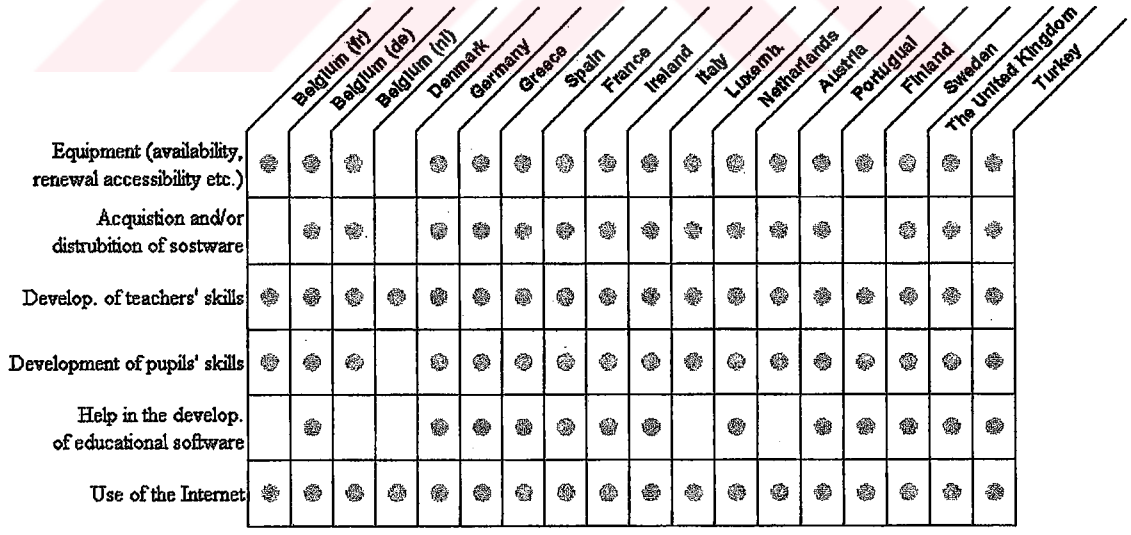


Table 4.8: Objectives in ICT Projects at Secondary Education Level in the EU Countries and Turkey (EURYDICE, 2001a; MEB, 2001; MEB, 2002a).



In the Netherlands, a national education network, the Kennisnet, in which schools, libraries and museums are linked together, was created in 1999. The policy of the Dutch government is geared to complete the development of the use of ICT for teaching purposes in every educational sector. The way schools achieve that goal is in their own responsibility, while the government provides the funding and supports them. Every Sweden Municipalities have the overall responsibility for project's objectives related to equipment and distribution of software. Also in Austria, the plan worked out for lower secondary education centers on developing the skills of teachers and pupils (EURDICE, 2000).

Several countries' projects also include objectives other than those cited in the above categories (the United Kingdom, Germany, and Ireland). They cover aspects such as the administration of the education system, monitoring the education system and innovations to it, and training all citizens in the use of the new technologies, etc (EURDICE, 2001a).

4.3. Financial Issues Regarding the Integration of ICT to the Education

Expenditure on equipment often predominates in specific budgets. A special budget is set aside to carry out projects in all the European Union countries concerned. It is not always possible to discover the distribution among the various headings. In Spain, for instance, the Centro Nacional de Informaciónу Comunicación Educativa (CNICE), the Spanish general directorate of educational technologies, does not allocate a budget for human resources because the staff and the teachers specializing in ICT are civil servants and their pay comes out of a different budget in

Spain. In France, teacher education and human resources are in the responsibility of the state whereas equipment is in the responsibility of the local authorities. In Italy, the distribution is different as it depends on the projects undertaken by the schools. In Luxembourg, at primary level, the equipment budget is the in responsibility of the municipality. In Austria, at primary level, there is no national budget; the *Länder* and municipalities may or may not provide a budget (EURYDICE, 2001a).

However, in Turkey, the budget allocated for ICT is a part of the general budget of the Ministry of National Education. Thus, a separate budget was not allocated for this purpose. Yet, in some schools contributions are received from school funds, school family associations and revolving funds. Machines, equipment, tools, etc. that are urgently needed by the school and cannot be provided from elsewhere are purchased at the expense of the revolving fund. Purchasing such urgent needs using the revolving fund is a great contribution for the schools. The workshop capacity, machine parks and technical labor potential in the schools contribute to production through the channel of revolving fund operations, following the regular training activities.

On the other hand, since there is not a separate budget allocated for ICT in Turkey, the data can not be reached how much is spent for human resources and how much is spent for hardware and software purchases.

Table 4.9: Distribution of the Specific Budget between the Purchase of Equipment and Expenditure on Human Resources at Primary Education Level (EURYDICE, 2001a).

Distribution / Type / Countries		Human Resources	Equipment	Distribution Not Defined
Belgium (fr)				100
Belgium (de)		(-)	(-)	(-)
Belgium (nl)				100
Denmark				100
Germany				100
Greece		100		
Spain				100
France				100
Ireland		41	59	
Italy				100
Luxembourg				100
Netherlands				100
Austria				100
Portugal		35	60	5
Finland		65	35	
Sweden		24	76	
United Kingdom	England, W, NI			100
	Scotland	20	80	
Turkey				**100**

Where it is possible to ascertain how the budget is distributed among the various headings, it can be seen that expenditure on equipment and facilities accounts for the larger share, and its relative size in the budget increases further at secondary level. Greece and Finland are exceptions in that, respectively, 100 % and 65 % of their budgets are earmarked for human resources. At upper secondary level, priorities are the opposite in Greece in which 20 % of the budget is devoted to equipment and facilities (see table 4.10). In Luxembourg, throughout secondary

level, almost the entire budget (90-95 %) is devoted to equipment (EURYDICE, 2001).

Table 4.10: Distribution of the Specific Budget between the Purchase of Equipment and Expenditure on Human Resources at Secondary Education Level (EURYDICE, 2001a).

Distribution / Type / Countries		Human Resources	Equipment	Distribution Not Defined
Belgium (fr)				100
Belgium (de)		40	60	
Belgium (nl)				100
Denmark				100
Germany				100
Greece		20	80	
Spain				100
France				100
Ireland		15.5	84.5	
Italy				100
Luxembourg		5	95	
Netherlands				100
Austria				100
Portugal		35	60	5
Finland		65	35	
Sweden		24	76	
United Kingdom	England, W, NI			100
	Scotland	20	80	
Turkey				**100**

4.4. Curriculum Issues Regarding the Integration of ICT to Education

In this part, computers and the Internet use of primary school teachers, ICT in primary education: is it a tool or an aim?, curricular objectives of ICT at primary level, include ICT in the secondary education curriculum as compulsory, computers

and the Internet use of secondary school teachers, reasons given for not using the Internet and computer by teachers, ICT as a separate subject curriculum at secondary level, the range of curricular objectives of ICT at secondary level.

For most of the EU countries ICT is seen as tools to be used throughout the entire curriculum, and reflect this in their policies and statements. Rather fewer countries, Denmark and the UK, for instance have taken measures to embed this by law, with the UK possibly going to the furthest in developing statutory orders for ICT in the national curriculum across all subjects and for all ages for 5 to 16. It is a moot point. Whether making something compulsory by law is more likely to increase really imaginative practice on the ground. This probably depends upon a whole set of cultural factors in different countries and the degree of centralization or de-centralization of educational systems (BECTA, 1998).

What is rare is to find examples of countries that are seriously re-examining their curricula in the light of the potential of new digital technologies to change not only how teaching and learning take place, but the actual subject content itself. For example, when graphical calculators can output instantly in graphical form the relationship between different variables and when geometrical packages can bring complex shapes to life immediately on the screen, then arguably the content of the mathematics curriculum needs to change to acknowledge this. When children can access information from thousands of servers on the World Wide Web, then the challenge is to develop network literacy or media competence, so that learners have both the technical and intellectual skills to cope with the information age, including the skills to become producers as well as consumers of information. There is much

talk of this happening but, so far, school curricula are proving somewhat resistant to change and are still 'secret gardens' guarded jealously by national bodies (BECTA, 1998).

In France, in primary education, the curriculum revised in 1995 takes into account the transverse dimension of computers and in particular through the use of word processing. In secondary education, computer learning is planned precisely in the programs of technology at secondary school and is offered as an option from the 5th form. As for the other subjects, some science subjects integrate it very directly – physics, mathematics, life and the earth sciences, for instance, whereas in the other subjects it is only lightly touched on in comments (BECTA, 1998).

In many European Union countries' curriculum ICT is included in primary education. Based on the countries conditions, inclusion of ICT differs from one country to another in primary education.

There is a consensus that ICT has impact on our education systems. In line with the impact of ICT, in Ireland, the Netherlands, Austria, and Portugal, ICT has become a part of the curriculum recently. For example, in Portugal, ICT has been part of the curriculum in primary education since the adoption of the statutory order of 18 January 2001. In the United Kingdom, ICT has been part of the curriculum in England and Wales since the National Curriculum was first introduced in 1988. In Northern Ireland, it has been a requirement since the Northern Ireland Curriculum was implemented following legislation passed in 1989 (EURYDICE, 2001b).

The curriculum in the Netherlands and in the United Kingdom does not specify the numbers of hours to be devoted to this compulsory subject as the schools are free to decide on the allocation of hours of teaching. In French of Community of Belgium, ICT has been planned for inclusion among the 'core skills' in education, in which the competence that pupils should acquire in the subject is clearly specified since 1999. The inclusion of ICT in courses is compulsory with effect from 2001. In Germany, the *Kultusministerkonferenz* and the legislation of the different *Länder* make recommendations on the use and the role of ICT in school life. On the other hand in Italy, there are no recommendations on the use of ICT in the curriculum, but one of the aims of the *Piano d'azione per la Società dell'informazione*, which was planned to supplement, strengthen and provide further funding for the *Programma diSviluppo delle Tecnologie Didattiche* in 2001-2003, is that ICT should be used to improve the effectiveness of teaching/learning and the way it is organized in each subject, as well as for the acquisition of general skills (EURYDICE, 2000).

Table 4.11: Inclusion of ICT in the Primary Education Curriculum (EURYDICE, 2001a).

Countries	Included ICT in the Curriculum	Not Included ICT in the Curriculum
Austria	√	
Belgium	√	
Denmark	√	
Finland	√	
France	√	
Germany	√	
Greece		√
Ireland	√	
Italy		√
Luxembourg		√
Netherlands	√	
Portugal	√	
Spain	√	
Sweden	√	
The United Kingdom	√	
Turkey		√

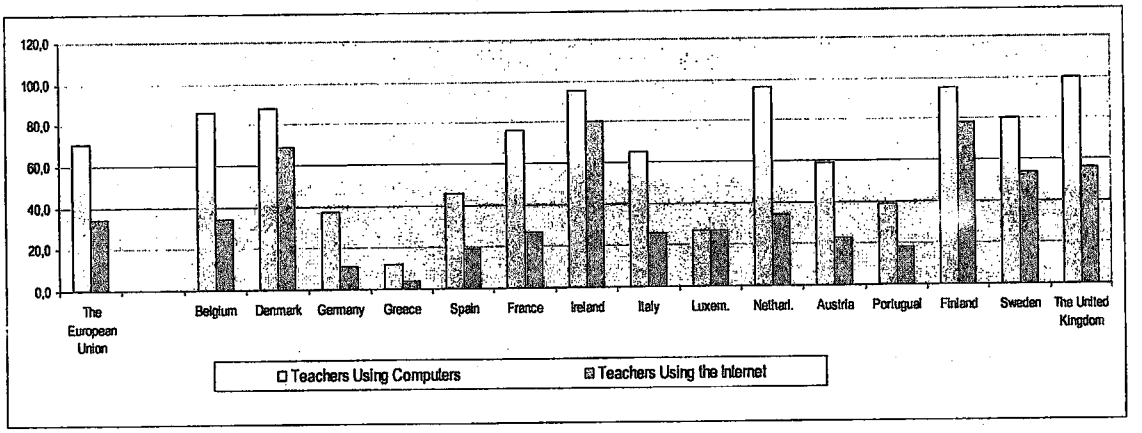
In contrast, ICT is offered as an option in some countries, in some cases only recently (some pre-accession countries). In the case of an elective course, the number of hours to be devoted to it is seldom specified in the curriculum. In other places, plans for its introduction are ongoing and sometimes the focus of experimentation in a limited number of schools (Greece, Italy, and Luxembourg). In Greece, ICT is not part of the curriculum but the Pedagogical Institute has encouraged its use in a pilot project involving 40 primary schools (EURYDICE, 2000).

On the other hand, in Turkey, ICT is offered as an elective option. In the case of an elective course, one or two hours to be devoted to it is seldom specified in the

curriculum for primary education. It sometimes depends on the school or students. It varies: one or two hours a week in Turkey (Kocaoluk & Kocaoluk, 2000).

Computers and the Internet Use of Primary School Teachers: As mentioned above, ICT is a part of the primary school curriculum in the most EU countries (except Greece and Italy). Its inclusion in curricula is borne out in the way teachers work given that, in the EU as a whole, a great many of them state that they use computers during lessons with their pupils (see table 4.12). As it is presented in table 4.12 use of computers and the Internet in the classroom is especially high in Denmark, Finland, Sweden and the United Kingdom, as well as in three countries (Belgium, Ireland and the Netherlands), in which the inclusion of ICT in primary school curricula has only become compulsory quite recently. By contrast, in other countries, the percentages of teachers using computers with their pupils are relatively low. The countries concerned are mainly ones that have not included ICT in Greece's and Luxembourg's curriculum yet (EURYDICE, 2001a).

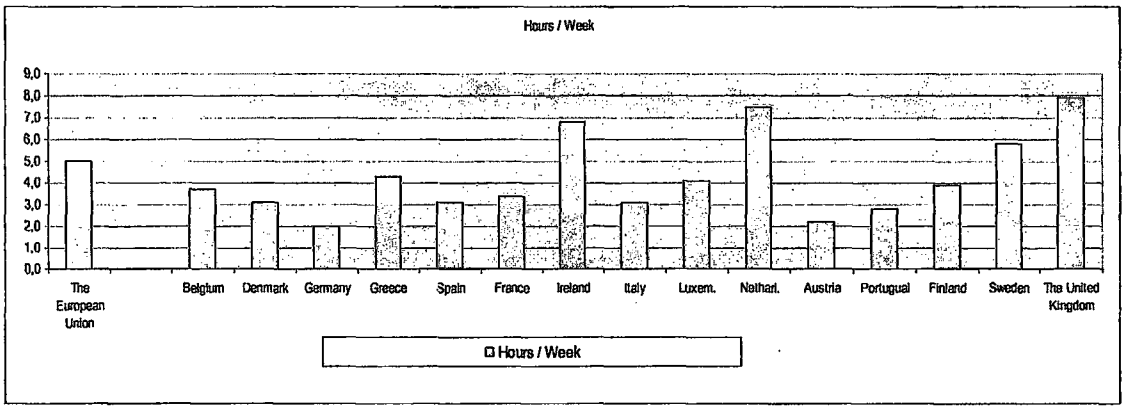
Table 4.12: Percentage of Teachers Who Use Computers and the Internet in the Classroom at Primary Education Level (EURYDICE, 2001a).



As many teachers use computers with their pupils, fewer do so in order to consult the Internet. In terms of the average EU figures, only around half as many do so. The percentages of teachers who consult the Internet with their pupils and of those who use computers for general teaching in the classroom are closest in Denmark, Ireland, Luxembourg and Finland. Conversely, in Germany, Greece, France and the Netherlands, the foregoing differences are very marked: only one-third of teachers who use computers in the classroom also do so in order to consult the Internet (EURYDICE, 2001a).

As it is presented in table 4.13, when primary school teachers in the EU use computers with their pupils, they use them on average for five hours a week. This average belies quite marked contrasts. The average period of usage is especially high in the United Kingdom (almost 8 hours), the Netherlands (7½ hours), and in Ireland (almost 7 hours a week). On the other hand, average periods of usage are the shortest (less than three hours a week) in Germany, Austria and Portugal. In Turkey primary education, there is not enough information on the average period of teachers' computer and the Internet usage both in class and individually.

Table 4.13: Average Period of Time during which Primary School Teachers Use Computers in the Classroom, in Hours per Week (EURYDICE, 2001a).



ICT in Primary Education: Is It a Tool or an Aim?: When ICT is included in the curriculum, two main approaches may be distinguished. It may be taught either as a separate subject in its own right, or used as a tool. These latter two approaches are the most widespread in the EU countries that have brought it into the curriculum for primary education.

ICT is a separate compulsory subject in some countries only: in the Netherlands, the United Kingdom. In the Netherlands, and the United Kingdom recommendations regarding the use of ICT are given throughout the curriculum (EURYDICE, 2000). In Turkey, ICT is a separate optional subject in the primary and secondary education curriculum.

Curricular Objectives of ICT at Primary Level: No matter what the approach is advocated, the objectives pursued by the teaching or the use of ICT at primary level can cover various categories. Four major fields are distinguished below:

1. to develop programming skills,
2. to learn correct use of a word processor, a spreadsheet,
3. to learn to search for information on a CD-ROM, a network,
4. to communicate via a network.

Table 4.14: Objectives Defined in the Curriculum for the Teaching or the Use of ICT at Primary Education Level (EURYDICE, 2000; Kocaoluk and Kocaoluk, 2000).

The Flemish Community of Belgium, Spain, Portugal in which no objective is clearly specified, the recommendations generally cover the different categories of objectives (see table 4.14). The curriculum does not specify any objectives, as ICT is used solely as a tool for other subjects and is not taught as a subject in its own right in the countries. In Netherlands, since 1998, the new media have been part of the cross-curricular attainment targets for primary education; objectives have been defined in all areas except programming skills. Finland's curricula are designed at local level on the basis of the national core curriculum. The schools define the objectives and what is taught on the basis of the national guidelines. Also in Sweden,

ICT is to be used as a tool in the classroom, although basic skills required for it are not listed. However, the development of programming ability is included at this level in the curricula of only two countries which are Germany, and the United Kingdom. In the United Kingdom curriculum objectives are defined in terms of the skills to be acquired and the functions to be accomplished through the use of ICT, rather than in terms of the particular tools, techniques and applications to be used (EURYDICE, 2000).

On the other hand; in Turkey the objectives of ICT at primary level are defined by the National Ministry of Education under specific definitions. Definitions target mainly to make students computer literacy. Additionally, another inference from the definitions includes creating an individual who able to use computers to solve the emerged problems. Objectives are distinguished as follows (Kocaoluk & Kocaoluk, 2000):

1. to get information about practical methods of using computers,
2. to get information about the definition, developments and ways of using computers,
3. to comprehend the numerical systems used in computers,
4. to identify the basic parts and their functions of computers,
5. to gain basic knowledge and skills on use of computers and computer programming,
6. to get the exact knowledge from the computers ,
7. to load the intended knowledge to the computers,
8. to get the information about the computers used at most,

9. to practice basic programs on computers.

Include ICT in the Secondary Education Curriculum as Compulsory: ICT is an integral part of the minimum curriculum at lower and upper levels of secondary education in virtually all countries. Recommendations about ICT are more recent in some countries than in others, Germany was the first to introduce the subject into the entire curriculum for secondary education in the late 1970s.

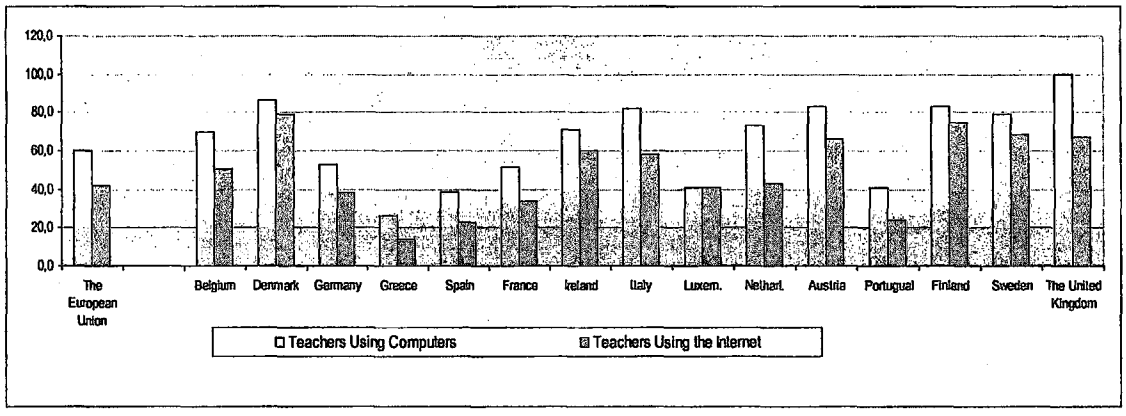
ICT has been part of the lower secondary curriculum in Greece and Scotland since the beginning of the 1980s, and included in certain branches of upper secondary education in Luxembourg since 1983. In the United Kingdom, ICT has been a statutory subject in England and Wales since the National Curriculum was first introduced into schools following legislation passed in 1988. In Northern Ireland, it has been a compulsory requirement since the Northern Ireland Curriculum was implemented following legislation passed in 1989. The Flemish Community of Belgium (lower secondary education), Ireland, the Netherlands (upper secondary education), Sweden (upper secondary education), brought the subject into their curricula in 1998 or 1999. In some countries, ICT is offered as an optional subject. In lower secondary education, it has only recently appeared in the curriculum in Portugal (EURYDICE, 2001b).

On the other hand, ICT is not included in the compulsory curriculum in general secondary education in Turkey. In the case of an elective course, two hours to be devoted to it is specified in the curriculum for secondary education. It sometimes depends on the school or students. It varies: two hours a week in Turkey.

Computers and the Internet Use of Secondary School Teachers: ICT is part of the minimum curriculum in (lower and upper) secondary education in almost all the EU countries (see table 4.15). The way teachers work bears witness to the inclusion of ICT as a subject or a teaching resource in curricula. Throughout the EU as a whole, the use of computers with pupils is undoubtedly less frequent than in primary education (corresponding to 60 % of teachers on average, instead of 71 %, see table 4.12), but disparities between countries are less marked at secondary level. However, percentages are especially high in Denmark, Austria, Finland, Sweden and the United Kingdom, as well as in Italy, in which ICT is not yet part of the compulsory secondary education curriculum (EURYDICE, 2000).

In almost all the EU countries, curricula for lower and upper secondary education refer to searching for information on a network or communicating via a network, as among the objectives to be pursued (see table 4.18). Yet, on average, less than half of all teachers use the internet with their pupils. The practice is therefore still not very widespread, except in Denmark and Finland (EURYDICE, 2001a).

Table 4.15: Percentage of Teachers Who Use Computers and the Internet in the Classroom at Secondary Education Level (EURYDICE, 2001a).



Generally speaking, differences between the percentages of schoolteachers who use computers in the classroom and those who consult the Internet with their pupils are lower in secondary than in primary education. These differences are least marked in Denmark, Ireland, Luxembourg, Finland and Sweden. They are biggest in Greece, Spain, the Netherlands and Portugal.

Reasons Given for Not Using the Internet and Computer by Teachers: The teachers classified reasons why they do not use the Internet with their pupils as fallows:

- problem of access,
- the Internet of little relevance or interest,
- difficulty in using facilities.

In most cases problems of access may arise, because their school is not equipped with computers or has no the Internet connection, or because classrooms

themselves do not provide for a connection (see table 4.16). This factor is especially significant in Germany and the United Kingdom. Much less frequent are reasons concerned with the lack of relevance of the Internet to their teaching. Because teachers consider that there is no need to turn to the Web for the one or more subjects on which they work with their pupils. The least commonly cited reasons are those related to lack of familiarity with the Internet on the part of pupils or the inability of teachers to use it. The foregoing ranking of factors is the same in the majority of the EU countries. Yet in France, Austria and Portugal, reasons having to do with difficulty in using the Internet are relatively more significant and cited by 20 % of teachers and indeed, in France, by over a third (EURYDICE, 2001a).

Table 4.16: Reasons Given for Not Using the Internet with Pupils at Secondary Education Level (EURYDICE, 2001a).

Countries	Problems of Access	Internet of little relevance or interest	Difficulty in Using Facilities
The European Union	**93**	**34**	**14**
Belgium	90	36	14
Denmark	30	66	11
Germany	116	34	4
Greece	69	27	19
Spain	64	25	8
France	85	38	36
Ireland	86	23	11
Italy	42	44	15
Luxembourg	66	49	4
Netherlands	73	16	10
Austria	46	29	26
Portugal	72	20	19
Finland	13	75	0
Sweden	49	60	10
The United Kingdom	118	37	6

In contrast, in Denmark, Finland and Sweden in which access to computers or the Internet is no longer a problem, and to a lesser extent in Italy, the most frequently given reasons are those having to do with the lack of relevance of the Internet or the information available on it (see table 4.16).

In Turkish education, there is not enough data on the average period of teachers' computer and the Internet usage both in class and individually. However according to the research in Turkey, the teachers classified some problems related to integration of computer to the curriculum as fallows (Çağıltay and et al, 2001):

- lack of enough computer,
- lack of teacher training about computer literacy,
- inappropriate instructional programs,
- lack of teacher knowledge about how to use computer in instruction,
- load of the curriculum.

ICT as a Separate Subject Curriculum at Secondary Level: There are only a few countries in which the minimum curriculum does not include ICT as a subject at general lower secondary level of education. These countries include the French Community of Belgium, Denmark, Ireland, Austria, Portugal, Sweden, and the United Kingdom (Northern Ireland). As in the case of primary education, these countries rely solely on ICT 'as a tool for other subjects'. By contrast, in lower secondary education, the majorities of countries offer ICT as a separate subject in its own right and use it as a tool to teach other subjects. ICT is present solely as a

separate subject in its own right in Greece and many pre-accession countries (EURYDICE, 2000).

Comparisons may be established where ICT is included as a separate subject in the minimum curriculum for lower secondary education and there are official recommendations regarding the time to be devoted to it. Several factors have a bearing on the time devoted to ICT as a separate subject, including the duration of lower secondary education, the number of years during which ICT is offered as a separate subject, and the number of class periods recommended for instruction in it. Because these factors vary from one country to the next, the time to be devoted to ICT as a separate subject has been calculated with respect to a 'notional' year in lower secondary education (see table 4.17). This average annual period varies enormously: in Spain, France and the Netherlands, it comes to over 40 hours, whereas in Germany, and Luxembourg, the average recommended annual number of hours is less than 20.

Table 4.17: Annual Number of Hours Recommended for Teaching ICT as a Subject in Its Own Right at Secondary Education (EURYDICE, 2001a).

Countries	Hours
Belgium (fr)	*
Belgium (de)	30,3
Belgium (nl)	#
Denmark	*
Germany	18,8
Greece	43,8
Spain	48
France	58,5
Ireland	*
Italy	(-)
Luxembourg	15
Netherlands	56,5
Austria	*
Portugal	*
Finland	#
Sweden	*
The United Kingdom (E/W)	#
The United Kingdom (NI)	*

* *Recommendations solely on the inclusion of ICT in other objects*
\# *Autonomy/No recommendations for hours to be allocated to ICT*
(-) Not applicable

The statistical data for Turkey about this concept does not exist yet.

Table 4.17 shows the number of hours devoted to teaching ICT as a subject in its own right in lower secondary education. In order to enable ready comparison between countries, this number of hours (60 minutes) is based on a notional year of lower secondary education.

In Finland, the curricula are prepared at local level on the basis of national guidelines. Schools can decide to include ICT in their curriculum as an elective

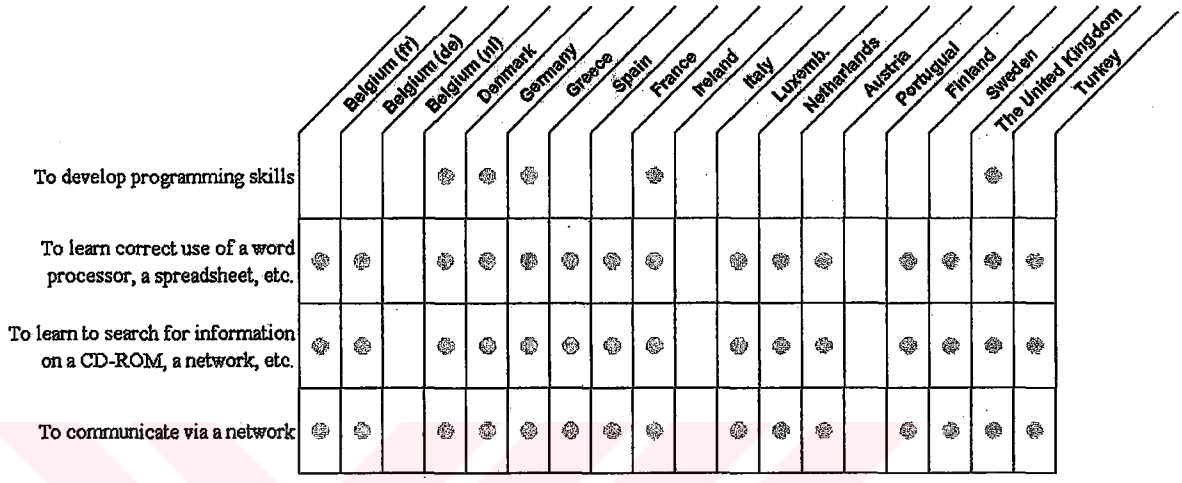
subject. Likewise, in the United Kingdom, during the first two years of lower secondary education, schools are free to decide whether they will offer ICT as a subject in its own right. During the last two years of lower secondary education, it is recommended that a certain number of hours should be set aside for technological activities and their applications. However, within this number of hours, it is impossible to identify the number devoted to the teaching of ICT.

As a matter of fact, in the case of some countries, extra time may be granted to ICT over and above the minimum number of compulsory hours (see table 4.17). Moreover, in the flexible part of the curriculum which schools are free to determine as they wish. Where schools are entirely free to determine the total number of hours earmarked for ICT, no estimate has been possible. The results obtained in ICT are taken into account when deciding whether pupils should progress to a higher class in Germany (when the subject is compulsory or a core curriculum option), Spain and Luxembourg. Pupils are externally assessed in this subject in France (when they complete lower secondary education). The knowledge and skills acquired are marked in each annual school report, or formally certified on completion of lower secondary education in the German-speaking Community of Belgium, Germany, and Luxembourg (EURDICE, 2001a).

The Range of Curricular Objectives of ICT at Secondary Level: The objectives of the courses in ICT at lower secondary level concern the four categories shown in table 4.18. In contrast, the development of programming skills is not specified at this level of education in many countries. In the United Kingdom, curricular objectives are defined in terms of the skills to be acquired and functions to

be accomplished through the use of ICT, rather than in terms of particular tools, techniques and applications to be used (EURYDICE, 2001a).

Table 4.18: Objectives Defined in the Curriculum for the Teaching or Use of ICT at Secondary Education Level (EURYDICE, 2001a).



Besides the above categories, the German curriculum includes courses to build awareness of the history of technologies, the problems of intellectual property and the role of the computer in the world of work. In Spain, the Netherlands, and the United Kingdom the curriculum also emphasizes the value or reliability of information and the role of ICT within society.

4.5. Teacher Education Issues Regarding the Integration of ICT to Education

In this part, specialization of teachers in ICT, preservice teacher education, official recommendations for ICT teaching in countries, inservice training, official ICT training courses given to teachers.

It is clear that, the role of teachers has changed, because of the ICT. It is easy to over-emphasize the point about the changing role of teachers; it is hard not to over-emphasize the scale of the challenge facing all national education systems in bringing about the sweeping programs of ICT training needed to help the mass of teachers to enter the digital age. Consequently, teacher education in using ICT should be a pre-eminent measure within all countries (BECTA, 1998).

Across Europe, two types of training have been identified:

- basic functional ICT competence,
- the pedagogical skills and understanding of ICT in the classroom.

Both of these require teachers to understand what new learning opportunities ICT may offer, how technical resources can be managed in the classroom and how learning might change as a result.

Specialization of Teachers in ICT: Teachers who are subject specialists in information and communication technologies are responsible for teaching this subject at primary and secondary level in only a few pre-accession countries and Turkey.

In contrast, teachers who have specialized in ICT are employed in secondary education in a great majority of countries. In Denmark, Italy, and Portugal, they are responsible for teaching ICT at upper secondary level only. However, the French Community of Belgium and Ireland do not train specialist teachers in ICT for any of the levels of education. In the Netherlands, teachers at primary and secondary level

may receive special training in ICT lasting for one year after their preservice training. On its completion, they are given the title of ICT coordinator (EURYDICE, 2000).

The preservice training of teachers specializing in ICT is in most cases provided at university level. Depending on the level of education at which they are to teach, some specialist teachers in the German-speaking and Flemish Communities of Belgium, and Austria may be trained in non-university tertiary education. The training of specialist ICT teachers lasts from one-and-a-half to 2 years in Austria *(Hauptschule)* to 7 years in Luxembourg.

In Turkey, considering the teacher requirements in relation to the eight-year of primary education implemented by the law no 4306. Teacher education programs have been reorganized with the cooperation of the Ministry of Education and the Higher Education Council in order to meet the short- and long-term teacher requirements of the primary and secondary education institutions. The new system that has been implemented since 1998-1999 academic year is based on the principles. A computer teaching technologies subject is a secondary school teacher with bachelor's degrees of four years (MEB, 2001).

According to official data from the Ministry of National Education, there are currently 2178 computer teachers in primary and secondary education (December 2002). The number of computer teachers that is needed is 6844 (MEB, 2002c).

Preservice Teacher Education: ICT is still not universally compulsory in preservice teacher training. In many of the EU Countries (except Italy), training in

ICT is compulsory for all future teachers whether they are intending to work in primary education or secondary education. In France, a two-year emergency program beginning in 1998 placed the focus on showing trainee teachers how to integrate ICT into teaching methods. In some countries, institutions are totally free to devise and structure their course of training as they wish. Depending on the institution concerned, training in ICT may be a compulsory subject, a core curriculum option or an optional subject. This applies to the preservice training of teachers for different levels of education in Ireland and Portugal. In Spain and in the United Kingdom, all those intending to teach at primary level receive training in ICT. On the other hand, corresponding provision for future secondary school teachers depends on the institution at which they undertake their preservice training (EURYDICE, 2000).

In a few countries (Italy and Germany), training in the teaching of ICT is one of the core curriculum options. The training institutions concerned are thus obliged to offer the subject, but the decision whether or not to include it in their overall course of training is made by the trainees. In Germany and Italy, this applies to the preservice training of all primary and secondary school teachers. In Greece, only teachers in primary education currently receive compulsory training in the teaching of ICT. At secondary level, this training is not provided. In Turkey, likewise to the EU countries preservice teacher education curricula, a new teacher education curriculum has developed.

The Council of Higher Education (YOK) is responsible for the planning, coordination, and supervision of higher education in Turkey. Parallel to the international practices in reforming preservice teacher

education for the new millennium, the Council of Higher Education has developed new teacher education curricula for schools of education in Turkey. According to the new curricula, a computer literacy course became a must course for all preservice teachers to fulfill the requirements for teaching credential. This new course is designed to improve and enhance teachers' IT skills (Yıldırım, 2000b, p.931).

> The main purpose of this course is defined in the new curriculum as to teach basic computer skills and introduce teachers to several commonly used computer applications such as word processing, spreadsheets, databases, telecommunications, and presentations programs. However, as described in the curriculum, preparing teachers for the use of these technologies into their classroom teaching is not among the course goals. Even though earlier practices of preservice technology training clearly ascertained that one computer literacy course is not of a high value unless computers are integrated into the whole teacher education program (Yıldırım, 2000b, p.931).

The amount of teaching related to ICT in the preservice training of teachers for lower secondary education is often determined by their training institution. In some European Union countries, training institutions are free to offer training in ICT to future teachers in general lower secondary education and may decide to organize this provision as a compulsory subject, a core curriculum option or an optional subject. In all such instances, institutions are also free to decide on the number of hours of teaching devoted to ICT. This situation is encountered in Spain, Ireland, and Portugal (see table 4.19).

In many countries in which ICT is a compulsory component of the preservice training of all teachers for lower secondary education, it is not possible to indicate the proportion of time devoted to ICT in the curriculum because of the autonomy of institutions in determining the amount of teaching involved. There is no recommendation establishing a minimum amount of teaching to be set aside for ICT. This applies to the Flemish Community of Belgium, Denmark, France, the Netherlands, Austria, Finland, and the United Kingdom.

Table 4.19: Percentage Share of Compulsory Teaching Related to ICT, and the Number of Hours Devoted to Such Teaching, in the Preservice Training of Teachers at Secondary Level Education (EURYDICE, 2001a).

Countries	Hours
Belgium (fr)	*
Belgium (de)	30,3
Belgium (nl)	#
Denmark	*
Germany	18,8
Greece	43,8
Spain	48,8
France	58,5
Ireland	*
Italy	(-)
Luxembourg	15
Netherlands	55,5
Austria	*
Portugal	*
Finland	#
Sweden	*
The United Kingdom (E/W)	#
The United Kingdom (NI)	*

* *Recommendations solely on the inclusion of ICT in other objects*
\# *Autonomy/No recommendations for hours to be allocated to ICT*
(-) Not applicable

The statistical data for Turkey about this concept does not exist yet.

In Germany and Italy teacher education courses in ICT are core curriculum options. Institutions are free to decide on the amount of teaching in the timetable that should be devoted to these core curriculum options. The percentage share of ICT in teacher education is no pointer to the actual number of hours devoted to it. This

varies enormously and there is no correlation between it and the foregoing percentage. This is largely attributable to differences, from one country to the next, in the amount of time in the entire compulsory curriculum for preservice teacher training. The total amount of time earmarked for ICT in training is greatest in Sweden (EURYDICE, 2001a).

Official Recommendations for ICT Teaching in Countries: The freedom of training institutions to specify the ICT related skills that future teachers should be required, is not as widespread as their freedom to determine the amount of teaching time devoted to ICT. In Spain, Ireland, and Portugal institutions are fully autonomous as regards the provision of ICT related teaching. Not only they are free to decide whether to offer it, -if they do, to specify its content- but also they are equally free to determine how much time should be devoted to such teaching.

In some countries, the recommendations of the educational authorities do no more than the state does; teaching ICT is compulsory, without specifying what skills should be developed and what content should be included. This applies to the French and German-speaking Communities of Belgium, Denmark, Austria and Finland, but also to Italy in which ICT related courses are a core curriculum option. These are also the countries in which the amount of time devoted to the compulsory teaching of ICT cannot be identified, in the majority of cases because institutions are autonomous as mentioned above (EURYDICE, 2001a).

In Germany, the Netherlands, and the United Kingdom all the fields (use of word processing programs, use of data processing programs, use of educational

software programs, and use the Internet) referred are recommended. In Luxembourg, the recommendations are also relatively precise. It is to be noted that in these four countries, institutions have little room for maneuver as regards to teaching ICT from the standpoint of either its proportional share of the timetable, or the content of provision. In France, the Netherlands and the United Kingdom, the content of training is determined to some extent by the standards specified for the award of the teaching qualification, although in England there is, in addition, a detailed curriculum for the use of ICT in teaching other subjects. However, the way in which the content is structured and delivered and the amount of time allocated depend largely on the individual institution.

In the majority of countries in which the areas to be taught are specified, as much importance is attached to a practical command of ICT for personal use, as mastery of it for teaching purposes. In Sweden, priority goes to teaching applications.

The skills to which importance is most frequently attached during preservice training of teachers for lower secondary education are the use of word processing and data processing programs. Recommendations less frequently emphasize the command of skills such as the use of educational software and the Internet.

Inservice Training: Important as preservice training is, the bulk of the teaching force is already in the system and will be there for 15–20 years to come, so inservice training is the biggest challenge. A wide range of methods are used to provide inservice training – both formal and informal. This includes traditional

courses, open and distance learning, one-to-one support in the classroom and providing teachers with personal equipment. In many cases needs are identified locally, and training is arranged locally, although in some countries there is a tendency to deliver the more advanced pedagogical training nationally and at a distance, using the technology as a medium (BECTA, 1998).

Several teacher training projects in Germany at Länder level and the 'Licence to Run a Computer' qualification in Finland illustrate how successful teacher-training schemes often start with small building blocks of competence to break down 'techno-fear'. Training needs to be customized to teachers' level of skill. Pre-sifting of teachers for training so that they are at the right level contributes to success. In Portugal, the Minerva project which ran from 1985 until 1994 established a teacher-training tradition which led to many informal sessions in schools. These were formative first steps for many teachers (BECTA, 1998).

In Finland, a rolling program of training will see 9,000 teachers (10 % of the workforce) trained in ICT pedagogy over a total of five weeks on a course with 7–10 days of direct tuition followed by distance training and private study. The National Board of Education purchases the training from universities with faculties of education (12 in number) and offers it free of charge to teachers. Only those with a 'computer license' – a vocational certification of basic competence – are accepted. By 1998, 5,500 teachers had started the course. Trials are also taking place in Finland with students receiving bursaries to train teachers in ICT. Seventy bursaries were awarded in 1997 (BECTA, 1998).

In Denmark, the Danish National Centre for Technology Supported Learning (CTU) focuses on teacher training, with programs for teachers. Without exception, all countries note the powerful developmental role played by large ICT education conferences and exhibitions. Sweden, Norway and the UK made particular mention of the developmental effect played by teacher attendance at these events (BECTA, 1998).

Most of the European Union countries that train their teachers in the ICT have defined policies on inservice training in this field. Most countries have an official plan for inservice training in which updating ICT skills is a priority. In Germany, updating ICT skills is part of an official plan but it is not regarded as a priority. Portugal is the exceptions as it does not have official plans in this area (EURDICE, 2000).

At primary level, inservice training in the new technologies is a right and not an obligation for all teachers, whether they are general or specialist teachers. In the United Kingdom, the New Opportunities Fund ICT training programs are intended to increase the expertise of all serving teachers in the use of ICT in their teaching, to the level of newly qualified teachers (EURDICE, 2001a).

At secondary level, inservice training in ICT is compulsory solely for teachers who specialize in technology in Germany, and Greece. The same applies to specialist teachers at upper secondary level in the German-speaking Community of Belgium. In Ireland, Finland and Sweden, at the different levels of education, there is a government initiative to give teachers support in acquiring and exploiting the

opportunities provided by ICT. In Ireland, initiation into ICT through inservice training is not compulsory but has nevertheless attracted over 75 % of teaching staff to at least one of the training courses on offer. In the same way as in Finland provision in Ireland makes it easier for teachers not only to acquire basic ICT skills but also to use them for teaching purposes. This final point relates to over half of all teaching staff in Finland. In Sweden, provision started in 1999 and involves 50 % of teachers (EURYDICE, 2000).

Official ICT Training Courses Given to Teachers: Throughout the EU as a whole, more teachers in primary schools than their secondary school counterparts have completed an official training course on the use of computers or the Internet in teaching situation. This applies to Spain, Ireland, Italy, Luxembourg, the Netherlands and the United Kingdom. In such as Denmark, Germany, France, Portugal, Finland and Sweden, the percentages of primary and secondary schoolteachers who have received official training are not very different from the first group.

In Turkey, inservice training activities have been organized at local level and attended by 65.323 personnel only in 2001. In all inservice training programs, a total of 221 thousand teachers have been trained in the use of computers, and primary education inspectors have had an intense inservice training (MEB, 2001).

The Ministry of National Education provides inservice training courses covering Computer Operation, Internet Operation, Authorware, Macromedia Dream Weaver, Data Entry, Web Design, Adobe Premier, Adobe Photoshop, Across Data

Base, PowerPoint, Windows 98, Word, Excel, Microsoft Office and ILSIS software in order (MEB, 2001):

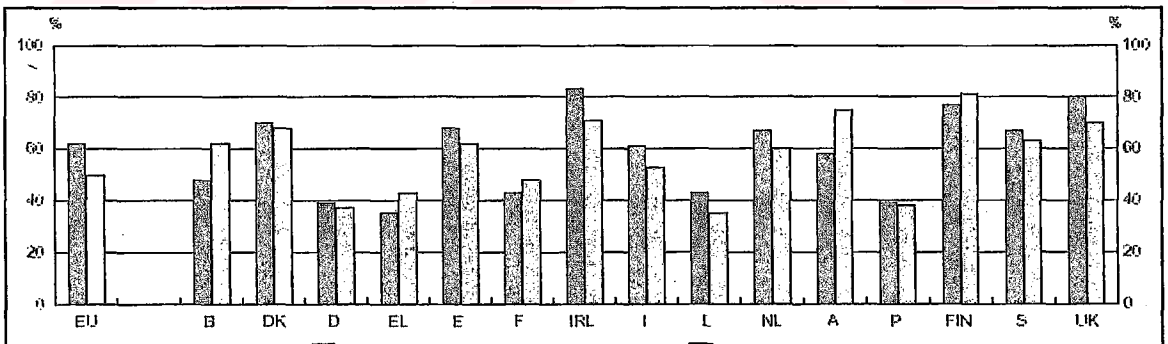
a) to expand computer and other technology assisted education practice,

b) to make use of computer in education, teaching and management services,

c) to establish communication between central and provincial organizations and education institutions.

The countries in which a large proportion of schoolteachers (at both primary and secondary levels) have been trained in this way are Ireland, Finland and the United Kingdom. Conversely, fewer teachers at present in Germany, Greece, Luxembourg and Portugal than anywhere else say they have undergone official training (EURYDICE, 2001a).

Table 4.20: Percentages of Primary and Secondary School Teachers in the EU Countries Who Had Received Official Training on Computer Usage (EURYDICE, 2001a).



	EU	B	DK	D	EL	E	F	IRL	I	L	NL	A	P	FIN	S	UK
☐	62	48	70	39	36	68	43	83	61	43	67	58	39	77	67	80
☐	50	62	68	37	43	62	48	71	53	35	60	75	38	81	63	70

The statistical data for Turkey about this concept does not exist yet.

The age of teachers seems to have little bearing on whether or not they have received official training in the use of computers or the Internet. In the EU as a whole, the percentages of teachers who have had such training vary little with the age-group to which they belong. The youngest teachers have not received this kind of provision in any greater numbers than their elders, so ICT training would still not appear to be fully incorporated in the preservice training of teachers at the start of their careers. Older teachers, for their part, have been able to benefit from official inservice training. Similarly and, here again, in the EU as a whole, neither the sex of teachers nor, in the case of secondary schoolteachers, the subject they teach appears to have any bearing on whether or not they have undergone official training (EURYDICE, 2001a).

Table 4.21: Percentages of Primary and Secondary School Teachers in the EU Countries Who Had Received Official Training on Computer Usage and the Internet (EURYDICE, 2001a).

	Primary Schoolteachers Who Have Been Officially Trained in the Use of:		Secondary Schoolteachers Who Have Been Officially Trained in the Use of:	
	Computers	**The Internet**	**Computers**	**The Internet**
20-29 years old	62%	46%	50%	39%
30-39	57%	40%	46%	35%
40-49	60%	40%	49%	33%
50 and over	62%	37%	47%	30%
Men	62%	44%	49%	34%
Women	60%	39%	47%	32%
Sciences	(-)	(-)	49%	34%
Social Sciences	(-)	(-)	43%	31%
Humanities	(-)	(-)	44%	27%
Languages	(-)	(-)	52%	37%
Professional/Tech. Cours.	(-)	(-)	46%	27%
Computing	(-)	(-)	54%	40%
Others	(-)	(-)	44%	31%

The statistical data for Turkey about this concept does not exist yet.

CHAPTER 5

CONCLUSIONS AND IMPLICATIONS

This final chapter addresses major findings related to the research questions of the study and suggests their implications for practice and further studies.

5.1. Conclusions

The purpose of this study is to reveal the differences and similarities between the EU countries' and Turkey's educational systems in terms of integration of ICT into national education policies, curricula and teacher education programs. Before discussing the results of the study, challenges (great numbers of people to educate, great land area, a very large educational system, poor economic conditions, inadequate technologies, and mass numbers of students and teachers) that Turkey faces should be taken into consideration the focus of this study (see table 4.1).

There is a relation between utilization of ICT and population, GNP, the number of students in primary and secondary education both in Turkey and the EU. Generally, countries with lower populations and number of students utilize ICT more than countries with higher populations and number of students. GNP is also highly

related to utilization of ICT; as GNP increases, utilization of ICT also increases (see table 4.1).

One of the results related with policies gathered from the analysis of the data is that profile of ICT in education is being raised in both Turkey and the European Union countries. There is an increasing awareness among politicians of the need to give more prominence and in some cases resources to ICT. The EU countries expect that investing in new digital technologies in education may bring significant social and economical implications. Consequently, policy sometimes originates from the highest political level, and results in strong government support and commitment.

In the inclusion of ICT, the second conclusion related with policies is the prime importance of communicative activity in the EU Countries' and Turkey's education systems. Personal e-mail addresses, training in the use of the Internet and other electronic communications, facilities for discussion or the sharing of practice among peers and easier database access have important role in this concept. Thus, it has affected the national policies considerably at the present time.

The European Union countries' and Turkey's national policies in integration of ICT to their educational systems have similarities and differences. The present systems in the EU countries are more systematic than Turkey; conversely, Turkey has more opportunities to provide services, training, equipment facilities, and resources in the field of education nowadays. Both Turkey and the EU countries have national or official bodies for supervision and promotion of national policy for ICT in education; however, EGITEK's duties and responsibilities are not clear and

limited (see table 4.2). Although Turkey has opportunities to provide services, training, equipment, facilities and resources in the field of education, Turkey's attempts to form policies in integration of ICT is not a successful as the EU countries due to the problems such as centralization bulky systems lacks of proper budget etc. the educational systems is facing.

Education systems are being directly targeted by national projects drawn up in all countries. These initiatives related with the whole of compulsory education and secondary education. Most of them are recent and began after 1995 (see table 4.5). On average, they last for five years, even though a few countries have begun projects planned to last for about ten years. The main aims are similar in nearly all countries, namely to boost the computerization of schools but also the practical use of ICT in education (EURYDICE, 2001a).

One of the national projects findings from the analysis of the data is projects which primarily reflect educational information and communication technologies are far fewer in number. In order to enhance the specific role of ICT as a learning resource, further progress in this area is necessary. The aim is to make ICT a more integral part of education systems with national projects.

Table 4.5 clearly showed that the most long-standing initiatives were launched in the 1980s, and only rarely involved all levels of the education. Luxembourg is the first country in the European Union countries in terms of starting ICT projects at upper secondary education level. As it is indicated in table 4.6, in

Turkey, national projects for the introduction of technology were started at secondary education level, as early as that of in the EU countries (1984).

By examining the existing data, it is difficult to compare ICT budgets of the EU countries and Turkey. Even though, the European Union's statistical data is available regarding the purchase and maintenance of ICT equipments, in Turkey there is no standardized database on financial data. This study does not therefore contain any information on the size of the budget allocated to ICT in the various countries. The difficulty of obtaining this sort of material is explained partly by the shared responsibilities for the purchase and maintenance of equipment. Equipment budgets are most often managed either at the local level or jointly, with the responsibility shared between several levels of authority in the EU countries. The way budgets are allocated between equipment and human resources has also proved difficult to identify clearly in many countries (EURYDICE, 2001a). Turkey's statistical data is not available regarding the purchase and maintenance of ICT equipment. Thus, the ICT budgets are hard to compare between the European Union countries and Turkey.

At primary and secondary level, learning about ICT has now become an integral part of the minimum compulsory curriculum in many countries in the EU (see table 4.11). At secondary level, this situation is virtually the norm. In a few cases however, the inclusion of ICT is a recent development. Elsewhere, schemes to include it are under way and sometimes the focus of experimentation in a small number of schools. The aims pursued differ little with the level of education. They cover a broad range of skills, extending from the use of various software packages to

communication via a network, not to mention CD-ROM or network-based information searches.

On the other hand, in Turkey, learning about ICT is not included in the compulsory curriculum in primary and secondary education. In the case of an elective course; it sometimes depends on the school or students.

A majority of teachers make use of ICT in the course of their teaching on a regular basis. In the European Union, 71 % and 60 % of teachers at primary and secondary levels respectively said they used ICT with their pupils on a fairly regular basis. Lack of access and problems of equipment or facilities are the major reasons given by teachers for not using ICT in the classroom. Lack of any official training in the use of computers or the Internet does not appear to be a factor preventing teachers from using them with their pupils. In the EU as a whole, just over half of those teachers who had no official training use computers during their lessons. Similarly, in secondary education, there is no apparent relation between the use of computers or the Internet with pupils, and the age of teachers. Again taking the EU as a whole, the percentages registered for each of the four age-groups range from 57 % of teachers using computers in the highest age-group to 65 % in the youngest, and 40 % using the Internet in the highest age-group to 44 % among those aged 30-39 (EURYDICE, 2001a).

Even though there is no statistical data available in Turkey, according to Çınar's research conducted in 2002 approximately 12 % of 538 teachers who were selected randomly from all the cities in Turkey use of computers once a day or more

than once a day. They feel themselves computer component, they have positive attitudes toward computers; however they do not use computers for instruction or for private purposes (Çınar, 2002).

The importance of teacher education goes hand in hand with the inclusion of ICT in the education of pupils. Indeed, only teachers who have themselves been trained in the use of ICT will be in a position to supervise their pupils effectively as they become fully familiar with and gradually master its essential resources.

In over half of all European countries, ICT has become a compulsory part of the curriculum for the initial training of teachers for either primary or secondary education. However, as regards the preservice education of secondary schoolteachers for whom data is available, official recommendations on the subject of ICT training are often general and stipulate only the compulsory nature of work on ICT during preservice education. In most European countries, minimum requirements concerning the amount of time to be devoted to the subject do not exist. Recommendations on content during initial training are more frequent and as much importance is generally attached to a practical command of ICT for personal use, as mastery of it for teaching purposes (EURYDICE, 2001a).

Organization, content and the amount of time set aside for such training are, in some countries, the prerogative of individual teacher training institutions. Their total freedom in this respect raises questions as to the compatibility of ICT training for future teachers in the institutions concerned and the uniformity of the skills they acquire.

Although all countries have laid down a policy for inservice teacher education which takes these aspects into account, it appears no less urgent to ensure that all future teachers acquire the necessary skills. This is an inescapable requirement if the younger generations are to master ICT.

In Turkey, parallel to the international practices in reforming preservice teacher education for the new millennium, the Council of Higher Education has developed new teacher education curricula for schools of education. According to the new curricula, a computer literacy course became a must course for all preservice teachers to fulfill the requirements for teaching credential. This new course is designed to improve and enhance teachers' IT skills (Yıldırım, 2000b).

> Even though this computer specific course is the first attempt preparing Turkish preservice teachers to use computer technologies in the classroom, this effort should go beyond only training the teachers on basic computer skills. If the Turkish Council of Higher Education is to prepare teachers for the 21st century, the Council should recognize the need for providing other courses concentrating on instructional strategies to promote teaching with the computer in the classroom. In addition to that the content of "Methods of Teaching" courses can be reorganized to introduce new teaching methods including those incorporating the computer. As a result of this reorganization, schools of education will not only be training preservice teachers on technology but they will also be training preservice teachers on teaching with technology (Yıldırım, 2000b, p.931).

On the other hand, according to Yıldırım, previous computer experience and providing teachers with equipment are important factors. Previous computer experience contributes to preservice and inservice teachers' competency and has an effect on their attitudes. Therefore, teachers' computer competency should be assessed before they enroll in a computer competency course (Yıldırım, 2000a)

Providing teachers with their own personal equipment is an undertaken measure intended to improve teachers' confidence and competence with ICT. The Multimedia Portables for Teachers Pilot in the UK shows that, once they have uninterrupted access, teachers are prepared to invest their time outside school in order to build their own ICT skills. They use CD-ROMs over 90%, the Internet 76% and portable at their homes and at school 95% for planning and delivering their teaching (BECTA, 2001).

The decrease in computer hardware prices enhances the efficiency of teacher-training strategies. It seems that in the future, it would cost less to provide a basic device than a day's training (BECTA, 2001).

As it is stated by Yıldırım (2000a) and in BECTA (2001) in order to have teachers implement ICT in their courses effectively, in addition to computer literacy courses, first, teachers should be equipped with the knowledge of "teaching with technology, and then in schools teachers" access to technology should be provided.

5.2. Implications for Practice

Based on the findings and discussion, the following recommendations are offered for practitioners in Turkey:

Successfully introducing ICT across the entire education system requires the active co-operation of central government, local and regional authorities, teacher-training establishments, curriculum bodies, school management and teachers. Policy making and planning for ICT integration thus needs to be holistic and comprehensive and not just focus on parts of the system. In Turkey, there should be much more regional autonomy and local authority on policies regarding the integration of ICT to education, and these regional and local authorities should take place in decision making process while forming the ICT related policies. The role of central government should be to provide guidance and to give advice. Duties and responsibilities of General Directorate of Educational Technologies' (EGITEK), which is the most important official association on ICT in education, should be more clear and limited.

The lack of reliable data on the spread, use and effects of ICT in Turkey is remarkable. Without appropriate data, it is impossible for policy makers to judge the effectiveness of plans for innovation. Minister of National Education and other authorities should co-operate in gathering, analyzing and disseminating data. Particularly, undertaken projects should be evaluated in such a way that new projects should be planned according to the results of this evaluation. Besides, educational

projects based on information and communication technologies should be increased in number and more budgets should be provided for these projects.

The budgets allocated to ICT should be more certain in amount. The overall aim on funding should be to allocate the necessary funds in education settings to enable the integration of ICT to education successfully.

There is little evidence that Turkey is seriously re-examining its curricula in increasing the use of new digital electronic technologies. Ideally, comprehensive plans for implementing ICTs should begin with learning targets related to the curriculum. Linked to this, ICT should be an integral part of the curriculum as a compulsory course at primary and secondary education. For this purpose, required measures should be taken.

Teachers should be provided more guidance in regard to what the students are expected to learn and whether learning should be about acquiring vocational skills or about learning for their own sake. And they need to be clearer about how children can be enabled and encouraged to learn. So, objectives of the ICT curriculum in primary and secondary education should be more applicable and relevant to daily uses.

There are real limitations on the value of existing hardware. Some of the machines in schools are over five years old; therefore those machines should be upgraded so that they can run the latest software. In order for the teachers in primary and secondary education to use computer and the Internet in classroom environment, required settings should be provided.

It is clear that the number of ICT teachers in primary and secondary schools is insufficient in number. Some measures should be taken in order to provide sufficient number of ICT teachers.

The EU countries previously agreed that all teachers would be skilled in the use of these technologies by the end of 2002 in order to provide pupils with a broad digital literacy (EUROPEAN COMMISSION, 2002). Turkey should also carry out the required studies as soon as possible.

Teachers should be provided with their own personal equipment so as to improve their confidence and competence with ICT. Computers can be given to teachers directly, or teachers can be allowed to offset their own purchase of machines against income tax.

Integration of ICT into educational system is undoubtedly one of the most challenging tasks which require government intervention in setting the frameworks. Pedagogical use of ICTs as well as basic training for the beginners will be needed in both preservice and inservice teacher training. Approaches like the use of peer support, personal access to the technology and the opportunity to learn from more skilled teachers can be employed in inservice teacher training. Specific measures need to be taken to ensure that ICT use is covered in all preservice training courses and that all serving teachers have access to appropriate inservice training that responds to their individual needs. Although there is a required computer literacy course for all preservice teacher education curriculum, the need for providing more

courses concentrating on ICT to promote teaching with computer in classroom should be recognized.

The EU countries previously agreed on the requirement that all schools should have access to the Internet and multimedia resources by the end of 2001 (EUROPEAN COMMISSION, 2002). The European Union countries reached these objectives in desired time period. To carry out the required studies as soon as possible, Turkey should allocate more budget and sources for ICT.

In primary education, the average of the number of pupils for per computer is 13.2 and number of pupils for per computer with the Internet connection is 32.9 in the EU countries. However, in Turkey, the number of pupils for per computer is 103.5 and number of pupils for per computer with the Internet connection is 2367.5. In secondary education, the average of the number of pupils for per computer is 8.6 and number of pupils for per computer with the Internet connection 14.9 in the EU countries. However, in Turkey, the number of pupils for per computer is 35.2 and number of pupils for per computer with the Internet connection 1020.1 in secondary education. Required measures should be taken as soon as possible in order to catch those ratios of the EU.

5.3. Implications for Research

There are not many research studies that examine the integration of ICT into education in the EU countries and Turkey. This study is expected to fill an important gap in the literature regarding the integration of ICT. This study will provide valuable

information on integration of ICT into the EU countries' and Turkey's educational systems.

In addition, this study may contribute to reveal the educational policies and build up a road map pertaining to education regarding the integration of ICT in Turkey's process of joining the EU. Additionally, the results of this study can help researchers and legislators in Turkey in improving a common education policy during the process of entering to the European Union.

5.4. Implications for Further Research

In addition to the implications made for practice, the following implications were made for further research. These will shed light on the situation and hopefully provide an impetus for future research on the European Union countries' and Turkey's education systems regarding the integration of information and communication technologies.

Between the EU countries and Turkey, research studies regarding the education systems in terms of ICT should be more in number, the standards should be identified more clearly and lastly the empirical and theoretical foundations should be strengthened. Regarding this issue, new studies can be carried out using surveys and interviews.

With respect to this current study, a similar research studies can be conducted to compare administrators', students', and teachers' perspectives about use of ICT in education between the European Union countries and Turkey. Also, with respect to

the current study, similar ones could be conducted to compare integration of ICT in educational systems of Turkey and the EU pre-accession countries and other countries.

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