

Türkiye’de ve AB Ülkelerinde Temel Eğitim ve Öğretmen Eğitimi Programları ile BİT’nin Bütünleştirilmesi

ICT Integration in Primary Education and Teacher Education Programs in Turkey and in EU Countries

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Öz

Bu araştırmanın amacı, Avrupa Birliği ülkeleri ile Türkiye’de bilgi ve iletişim teknolojilerinin (BİT) ilköğretim ve öğretmen eğitimi programları ile bütünleştirilmesi sürecindeki farklılıkları ve benzerlikleri incelemektir. Araştırma 2004 yılından önce Avrupa Birliği’ne üye 15 ülkeyi ve Türkiye’yi kapsamaktadır. Veriler resmi dokümanlar, raporlar ve Türkiye ile Avrupa Birliği ülkelerinde ilgili kurum ve kuruluşların kaynaklarından toplanmıştır. Araştırma bulguları, eğitimde bilgi ve iletişim teknolojilerine verilen önemin hem Türkiye’de hem de Avrupa Birliği ülkelerinde arttığını göstermektedir. İlköğretim düzeyinde, bilgi ve iletişim teknolojileri çoğu Avrupa ülkelerinin programlarında zorunlu olmasına karşın, Türkiye’de halen ilköğretim programında zorunlu değildir. Avrupa Birliği ülkelerinin yarıdan fazlasında bilgi ve iletişim teknolojileri hizmet öncesi öğretmen eğitimi programında zorunlu olmasına karşın, bununla ilgili asgari koşul belirtilmemektedir. Türkiye’de hizmet öncesi öğretmen eğitimi programında bilgi ve iletişim teknolojilerine ilişkin zorunlu iki ders mevcuttur.

Anahtar Sözcükler: Bilgi ve iletişim teknolojileri, Temel eğitim, Öğretmen eğitimi.

Abstract

The main purpose of this study is to investigate the differences and similarities between the EU countries’ and Turkey’s integration of information and communication technologies (ICT) into primary education curricula and teacher education programs. Fifteen EU countries which became members before 2004 and Turkey are included in the study. The data for the study were gathered from official documents and related resources. The results show that the importance of ICT in education is increasing both in Turkey and in the EU countries. Learning about ICT has become an integral part of the compulsory curriculum in most EU countries. However, in Turkey, ICT is not included in the compulsory curriculum in primary education. Even though ICT was compulsory in more than half of the EU countries’ preservice teacher education programs, there was no minimum standard related with this issue. In Turkey, two ICT related courses were compulsory in preservice teacher education programs.

Key Words: Information and communication technology, Primary education, Teacher education.

Introduction

Through the end of 20th century, and in the beginning of this century, economic and societal challenges occurred in the world much of which happened together with the development of information and communication technology (ICT). “This has profound implications for education, both because ICT can facilitate new forms of learning and because it has become important for young people to master ICT in preparation for adult life” (OECD-PISA Report, 2003, p.8). According to OECD-PISA report (2003), young people will need to integrate ICT into their adulthood in a variety of ways to be able participate in a developed society. Societies and economies can compete in global market when

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they invest in effective integration of ICT. It is clear that competency in ICT usage is unavoidable for the workforce of today's society. At all levels of education, familiarity with emerging technology is therefore becoming more and more essential, if one wants to function effectively in this new "information age" (Parker, 1997). Modern educational systems, both at the K-12 grade and the university levels, must accordingly prepare students to cope with changes in information technology. In this context, the integration of ICT into education is a critical issue. To formally integrate ICT in primary education curricula and teacher education programs, many action plans and a variety of standards have been adopted by the European Union (EU) countries and Turkey.

In 1999, the European Commission proposed its "eEurope" plan to manage the transition into the information age, both within the Union itself and within the candidate countries of Central and Eastern Europe. In order to have the most competitive knowledge-based economy by the year 2010, the European Commission accorded special importance to eEurope and other related educational strategies in 2002. With the eEurope project, they tried to create a digitally literate Europe. The EU heads of state agreed that by the end of 2003, there should be one computer for every fifteen students in EU schools (EUROPEAN COMMISSION, 2002a). While the pace of implementation has varied greatly, there is no doubt that all the countries in the European Union (EU) now attach a very high priority to ICT in their national education policies; they are also currently adjusting the organizations and functions of their education systems as a result (EURYDICE, 2001a).

In the process of joining to the EU, Turkey needs to develop educational policies which integrate ICT into the educational system. To provide the big picture in this process, this study aims to investigate the differences and similarities between the EU countries' and Turkey's integration of information and communication technologies (ICT) into primary education curricula and teacher education programs. The following research questions guided the data collection and analysis: (1) What is the extent of the integration of ICT in primary education in Turkey and the EU countries in regard to *curriculum issues, curricular objectives, and computer and the Internet usage of primary school teachers?* and (2) What is the extent of the integration of ICT in teacher education programs in Turkey and EU countries in regard to *pre-service teacher education, and in-service training of teachers?* Similar to the actions taken in European Commission, in Turkey, the work on integration of ICT into educational system has started as early as 1984, and then in 1991, computer-aided instruction was introduced to the national education systems as a national policy (Akbaba-Altun, 2006). In 1992, "a special unit was created within the General Directorate of Computer Education and Services (BILGEM) to take responsibility for the Computer Experimental Schools (CES) Project" (Schware and Jaramillo, 2004, p.1). The purpose of CES project was to integrate technology into the teaching and learning processes to enhance education, and 53 schools were selected for that purpose. However, Schware and Jaramillo (2004) indicated that due to the distribution of the schools in a wide geographical area, there were some problems on monitoring and supporting the schools. They suggest that "professional leadership must be provided over a long-term period, along with unambiguous policies and the capacity to offer technical guidance" (p.4). Pelgrum (2001) also highlights the importance of assessing the practices in ICT integration by educational policy makers.

In 1998, through National Education Development Project, the Ministry of National Education (MONE) has started initiatives to train both teachers and students in ICT. The MONE was aiming to provide instructional technology rooms and Internet connection for all basic education schools through the project. Hargreaves (1996) indicated that if teachers are not taken into consideration, the struggles in integrating ICT into teaching/learning process have little value (cited in Asan, 2002). In line with these developments, the Higher Education Council (HEC) redesigned the curricula of teacher-education institutions in order to improve the quality of their programs, and to integrate ICT into these programs in 1998. According to the new curricula, the "Computer Applications in Education" and "Instructional Technology and Material Development" courses became compulsory in both primary and secondary pre-service teacher education programs. The main purpose of "Computer Applications in Education," which is a computer literacy course, is to teach basic computer skills and to introduce teachers to several commonly used computer applications, such as word processors, spreadsheets, databases, telecommunications, and presentations programs. In "Instructional Technology and Material Development," prospective teachers gain knowledge and skills in a variety of instructional technologies, develop and evaluate technology-based instructional materials (HEC, 1998).

To be able to have effective ICT integration in that process, teachers should be knowledgeable about both the basic computer applications and the way how these applications can be used in classroom settings. In other words, they should be trained in both 'about technology, and technology as a tool for learning'. Askar and Usluel (2002) indicated that rather than using computers for instructional activities, teachers used computers for administrative tasks (cited in Askar, Usluel and Mumcu, 2006). Askar, Usluel and Mumcu (2006) highlighted the importance of "task related analysis in the framework of innovation characteristics" (p.144) for strategies in ICT integration into education.

Even though major actions were taken related with integration of ICT into education in Turkey, there are considerable economic differences between Turkey and the EU member countries. Turkey faces serious challenges in education with a great number of students and teachers, widespread school area, a very large educational system, poor economic conditions, and insufficient technologies. While examining the findings of this study, conditions of Turkey and the EU countries need to be considered.

Method

Document analysis, a form of qualitative research method was used in this study. Document analysis is an important method to collect data when it is very difficult or impossible to reach the target subjects or organizations (Yıldırım & Simşek, 2005). As the first step, it was decided that majority of the documents would be reached through the Internet and organizations. To be able to reach reliable documents, the official web sites and documents of the EU and Turkey were considered to be examined as the second step. As the third step, in order to guide the analysis of the data and compare fifteen EU countries with Turkey in terms of their integration of ICT in primary education curricula and teacher education programs, five main themes were determined for the purpose of this study: (a) curriculum issues regarding the integration of ICT in education, (b) curricular objectives of ICT at the primary school level, (c) computer and the Internet use of primary school teachers, (d) pre-service teacher education, and (e) in-service teacher training issues related to the research questions. Then, official documents, reports, and the resources of Eurydice, Becta, the European Commissions, and Turkey's Ministry of National Education were examined based on these themes. As the last step, the information gathered as a result of document analysis were organized under the related themes and countries. Then the findings were interpreted and organized within two categories, which constituted ICT usage in primary education curricula and in teacher education programs.

Findings

The Integration of ICT in Primary Education

(a) *Curriculum issues regarding the integration of ICT in education.* When ICT is integrated in a curriculum, two main approaches appear to be prevalent. Computer and related applications may be taught either (1) *as a separate subject (teaching / learning about computers)*, or (2) *used as a tool for learning or teaching*. These two approaches are widespread in those EU countries which have introduced ICT into their curricula for primary education (see Table 1). The findings indicated that the study of ICT at the primary education level has now become an integral part of the minimum compulsory curriculum in many countries in the EU. In a few cases, however, the integration of ICT is a recent development. On the other hand, in Turkey, the study of ICT is not included in the compulsory curriculum in primary education, but is offered in the form of an elective course.

For most of the EU countries, ICT is perceived as a tool to be used throughout the entire curriculum, and to be reflected in their policies and statements (Table 1). Denmark and the United Kingdom (UK), for instance, have taken measures to embed this in their laws. The UK has possibly gone the furthest in developing statutory orders for including ICT in the national curriculum across all subjects and for all K-12 levels. However, making ICT integration compulsory by law depends upon the countries' cultural factors and the degree of centralization or de-centralization of the educational systems (BECTA, 1998).

Except for Italy, ICT is generally included in the primary education compulsory curricula of the EU countries. In addition to the use of ICT as a tool for other subjects, in the UK (except for Northern Ireland) and the Netherlands, it is taught as a separate subject in the compulsory curricula (Table 1). Based on the conditions of the countries, however, the inclusion of ICT differs from one country to another. There is consensus that ICT has a significant impact on education systems. In line with this consensus, in Ireland, the Netherlands, Austria, and Portugal, ICT has recently become a part of the curriculum. For example, in Portugal, ICT has been a part of the curriculum in primary education since the adoption of the statutory order of 2001. In the UK, 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 the legislation passed in 1989 (EURYDICE, 2001b).

The curricula used in the Netherlands and the UK do not specify the number of hours to be devoted to this compulsory subject, as the schools are free to decide on the allocation of hours of teaching. "In Germany, ICT is a core curriculum option. Institutions are free to decide on the amount of teaching in the timetable that should be devoted to these core curriculum options" (EURYDICE, 2004, p.48).

Table 1.

Inclusion of ICT in the Primary Education Curriculum

Countries	Included in the Curriculum	Offered as an Elective in the Curriculum	Used as a Tool for Other Subjects	ICT as a Separate Subject
Austria	√		√	
Belgium	√		√	
Denmark	√		√	
Finland	√		√	
France	√		√	
Germany	√		√	
Greece	√		√	
Ireland	√		√	
Italy		√		
Luxembourg	√		√	
Netherlands	√		√	√
Portugal	√		√	
Spain	√		√	
Sweden	√		√	
The UK	√		√	√
Turkey		√		√

(EURYDICE, 2004, p.20; Kocaoluk & Kocaoluk, 2000)

In contrast, ICT is offered as an elective course in Italy. In the case of an elective course, the number of hours and content to be devoted to ICT is rarely specified in the curriculum. In this country, plans for the integration of ICT are ongoing. Sometimes they pilot their plans in a limited number of schools. In Greece, ICT is included in the curriculum, however, it is offered to the students in 'All Day Primary Schools', and participating this type of primary school is not compulsory (EURYDICE, 2004, p. 20).

On the other hand, in Turkey, ICT is offered only as an elective course. The course load varies from one to two hours per week. In the case of an elective course, its content is seldom specified in the curriculum for primary education. It sometimes depends on the school, the teachers, or the students (Kocaoluk & Kocaoluk, 2000).

(b) *Curricular objectives of ICT at the primary level.* The objectives pursued along with the integration of ICT at the primary level can cover various categories. Five major objectives are distinguished below (EURYDICE, 2004, p.23):

1. to develop programming skills,
2. to learn the correct use of word processors and spreadsheets,
3. to learn to search for information on CD-ROMs and networks,
4. to communicate via networks.
5. to use ICT to enhance subject knowledge

The document analysis indicates that, based on these five objectives, in three EU countries (Belgium (nl), Luxembourg and Spain) no objective is clearly specified, the recommendations are on several categories of objectives (Table 2). Their curricula do not specify whether ICT should be used solely as a tool to learn or to teach other subjects. The development of programming ability is included at this level in the curricula of Germany, Greece, and the UK. In the UK, 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. Among the countries that specified objectives, Belgium (fr) does not include 'learning a word processor and a spreadsheet' as an objective, and Portugal does not include 'to communicate via a network' as an objective. Only three countries; Germany, Greece and the UK include 'developing programming skills' in their objectives (EURYDICE, 2004, p.23).

Since 1998, in the Netherlands, the integration of ICT has been a part of the curricular accomplishment target for primary education; objectives have been defined in all areas except for programming skills. Finland's curricula and objectives are designed at the local level, but on the basis of the national core curriculum (EURYDICE, 2000).

Table 2.

Curriculum Objectives for Teaching or/ and Using ICT at Primary Education Level

Countries	No objectives determined	To develop programming skills	To learn correct use of a word processor, a spreadsheet	To learn to search for information on a CD-ROM, a network	To communicate via a network	To use ICT to enhance subject knowledge
Austria			√	√	√	√
Belgium (fr)				√	√	√
Belgium (de)			√	√	√	√
Belgium (nl)	√					
Denmark			√	√	√	√
Finland			√	√	√	√
France			√	√	√	√
Germany		√	√	√	√	√
Greece		√	√	√	√	√
Ireland			√	√	√	√
Italy						
Luxembourg	√					
The Netherlands			√	√	√	√
Portugal			√	√		√
Spain	√					
Sweden			√	√	√	√
The UK		√	√	√	√	√
Turkey			√	√		

(EURYDICE, 2004, p. 23; Kocaoluk & Kocaoluk, 2000)

In Turkey, the objectives of ICT at the primary level have been defined by the Ministry of National Education. Definitions focus mainly on computer literacy and the use of computers to solve problems. The objectives are as follows (MEB, 1998, p. 2):

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 information and skills on the use of computers and computer programming,
6. to get exact information from computers,
7. to load information onto computers,
8. to get information about the most popular computers,
9. to practice basic programs on computers.

(c) *Computers and the Internet use of primary school teachers.* As mentioned above, except for Italy, ICT is a part of the primary school curricula of the EU countries. Its integration into the curricula is shaped mostly by the teachers' ways of working with it. In the EU countries as a whole, most of the teachers state that they use computers during lessons with their pupils. As presented in Table 3, the use of computers in Belgium, Denmark, Finland, France, Ireland, the Netherlands, Sweden, and the UK, and the use of the Internet in the classroom in Denmark, Finland and Ireland by the teachers are especially high. Even though inclusion of ICT in primary school curricula is not compulsory in Italy, the use of computers by teachers is high. On the other hand, in Greece and Luxembourg, the percentages of teachers using computers with their pupils are relatively low (EURYDICE, 2001a).

Table 3.
Computer and Internet Usage of Teachers at Primary Education Level

Countries	Teachers Using Computers (%)	Teachers Using the Internet (%)
EU	71	34
Austria	59	23
Belgium	86	34
Denmark	88	69
Finland	95	78
France	76	27
Germany	37	11
Greece	12	4
Ireland	95	80
Italy	65	26
Luxembourg	27	27
The Netherlands	96	34
Portugal	39	18
Spain	46	19
Sweden	80	54
The UK	100	56
Turkey	*	*

(EURYDICE, 2001a, p. 35), * *Statistical data is not available*

Although many teachers use computers with their pupils, fewer do so to consult the Internet. The comparative percentages of teachers who use the Internet and the percentages of those who use computers for general teaching in the classroom are closest in Denmark, Ireland Finland and Luxembourg, . However, in Germany, Greece, France, and the Netherlands, only approximately one-

third of the teachers who use computers in the classroom also do so to use the Internet (EURYDICE, 2001a). In Germany, Greece, Portugal, and Spain, the teachers' use of Internet is the lowest.

As presented in Table 4, primary school teachers who use computers with their pupils in the EU countries use them on average for five hours a week. The average period of usage is especially high in the UK (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 Austria, Germany and Portugal.

In Turkey, at the primary education level, there is not enough information on the percentages or the average period of teachers' computer and Internet usage, either in classes or individually.

Table 4.

Average Period of Time Primary School Teachers Computer Use in the Classroom

	EU	Austria	Belgium	Denmark	Finland	France	Germany	Greece	Ireland	Italy	Luxembourg	Netherlands	Portugal	Spain	Sweden	The UK	Turkey
Hours/Week	5,0	2,2	3,7	3,1	3,9	3,4	2,0	4,3	6,8	3,1	4,1	7,5	2,8	3,1	5,8	7,9	*

(EURYDICE, 2001a, p.14), * *Statistical data is not available*

The Integration of ICT in Teacher Education

It is clear that the promise of ICT has changed the roles of teachers. All national education systems face a challenge in creating the extensive ICT training programs needed to help their teachers to integrate ICT in their classrooms. Consequently, the integration of ICT in teacher education is becoming a top focus within all countries (BECTA, 1998).

(d) *Pre-service teacher education.* The findings of the study indicate that there is no common pattern of integration of ICT into teacher education programs in the EU countries. However, in some countries there are official recommendations in regard to desirable ICT skills for the pre-service training of all teachers. These recommendations include the *use of word processing and data processing programs, educational software, and the Internet for both personal use and teaching applications.* In teacher education programs within the EU countries, the integration of ICT can be compulsory, a core curriculum option, or institutional autonomy. In almost one third of the fifteen EU countries, ICT has become a compulsory part of the curriculum in the pre-service education of teachers for both primary and secondary education. However, the organization, content, and the amount of time to be devoted for such ICT training are not standardized, since each institution has its own rules (EURYDICE, 2000). In Turkey, ICT became a compulsory part in the curriculum in both primary and secondary pre-service teacher education after 1998. All teacher education institutions now provide the same ICT-related courses in both the primary and secondary teacher education programs (HEC, 1998).

Table 5.
Integration of ICT into Pre-service Teacher Training Programs

Countries	ICT compulsory training			Core curriculum option			Institutional autonomy		
	Primary	Lower Secondary	Upper Secondary	Primary	Lower Secondary	Upper Secondary	Primary	Lower Secondary	Upper Secondary
Austria	√	√	√						
Belgium							√	√	√
Belgium	√							√	√
Belgium	√	√	√						
Denmark	√	√	√						
Finland							√	√	√
France	√	√	√						
Germany				√	√	√			
Greece	√							√	√
Ireland							√	√	√
Italy	√	√	√						
Luxembou	√	√	√						
The Neth.	√	√	√						
Portugal							√	√	√
Spain	√							√	√
Sweden	√	√	√						
The UK	√	√	√						
Turkey	√	√	√						

(EURYDICE, 2004, p. 43-44; HEC, 1998)

Except for Germany, where ICT is a core curriculum option, in all the other EU countries, ICT had become either a compulsory part of the curricula or under the autonomy of the institutions for pre-service teacher education programs at the primary level. In Germany, teacher training institutions are required to offer ICT-related courses as a core curriculum option.

In lower secondary-education teacher education programs, ICT was made a compulsory element in the curricula of most of the EU countries (Table 5). Only Belgium (fr, de), Greece, Ireland, Portugal, and Spain have not made ICT compulsory, and teacher education institutions have the right to decide whether or not to offer training in ICT at lower secondary-education teacher education level. In Germany, ICT is a part of the core curriculum, but the training institutions are free to decide whether ICT training should be compulsory or not.

In general, in upper secondary level teacher education programs, there is a similar situation with regard to the integration of ICT. In Germany, ICT is offered as a core curriculum option. In Belgium (fr, de), Finland, Greece, Ireland, Portugal and Spain, it is up to the institution to decide. The rest of the EU countries have included ICT training as compulsory in these programs.

In Turkey, as it is the case in the EU countries, the Higher Education Council (which is responsible for the planning, coordination, and supervision of higher education) has developed new teacher education curricula for its schools of education, and ICT has been included in the new teacher education curricula since 1998. According to the new curricula, the "Computer Applications in Education" and "Instructional Technology and Material Development" courses became compulsory in both primary and secondary pre-service teacher education programs (HEC, 1998).

(e) *In-service training of teachers.* In-service training of teachers is the most challenging task, since there have been too many teachers already in the system for many years in both the EU countries and in Turkey. Many of these teachers were trained by means of a variety of formal and informal methods, such as traditional courses, open and distance learning, one-to-one support in the classroom, and the provision

of teachers with personal equipment. In the EU countries, the training needs of teachers are identified locally, and training is likewise arranged locally most of the time. However, in some countries there is a tendency to deliver more advanced pedagogical training nationally and internationally in form of distance learning, using technology as a medium (BECTA, 1998).

Even though the content and the implementation of official in-service teacher training in ICT varies from one EU country to another, as is shown in Table 6, more than half of the teachers at both the primary (58.53 %) and secondary (57.73) levels have received in-service training in ICT in the EU countries. In Denmark, Germany, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden and the UK, the proportion of primary school teachers who have completed ICT training is grater than that of secondary school teachers. In Denmark, Finland, Ireland, and the UK, a large proportion of the teachers at both the primary and secondary levels have received training. When the percentages of the teachers who have participated in ICT training both at the primary and secondary levels is compared to the average percentage of the all teachers who have received training in the EU countries, the proportions of ICT-trained teachers in France, Germany, Greece, Luxembourg, and Portugal are the lowest (EURYDICE, 2000).

Table 6.

Primary and Secondary School Teachers Trained on Computer Usage

Countries	Primary School Teachers (%)	Secondary School Teachers (%)
EU	58.53	57.73
Austria	58	75
Belgium	48	62
Denmark	70	68
Finland	77	81
France	43	48
Germany	39	37
Greece	35	43
Ireland	83	71
Italy	61	53
Luxembourg	43	35
Netherlands	67	60
Portugal	39	38
Spain	68	62
Sweden	67	63
The UK	80	70
Turkey	*	*

(EURYDICE, 2001a), * 40% of all primary and secondary school teachers received training as of 2001.

In Turkey, The Ministry of National Education provides in-service training courses covering Computer Operation, Windows, Internet Operation, Authorware, Macromedia Dream Weaver, Data Entry, Web Design, Adobe Premier, Adobe Photoshop, Data Base, PowerPoint, Word, Excel, and ILSIS software in order to:

- expand computer and other technology assisted education practice,
- make use of computers in education, teaching, and management services, and to
- establish communication between central and provincial organizations and educational institutions (MEB, 2001).

In Turkey, in-service training activities have been organized at both the central and local levels, but were attended by only 65,323 personnel by 2001. In all of the in-service training programs, a total of

221,000 teachers (approximately 40 % of the total) were trained in the use of computers (MEB, 2001). This is close to or greater than the average percentages of primary and secondary school teachers who received ICT training in Germany, Greece, Luxembourg, and Portugal. In 2003, Ministry of Education incorporation with Intel, has started "Education Project for Future," and trained 30.000 teachers in ICT usage. By the end of 2006, it is planned to train 20.000 more teachers. In addition to this project, Ministry of Education, together with Microsoft Corporation has started another project called "Distance Teacher Training" project. As of February, 2006, 85,630 teachers enrolled in the program and 263.420 certificates in variety of subjects in ICT were given to the participating teachers (MEB, 2006 a).

Conclusion

The findings of the document analysis show that the importance of ICT in education is increasing both in Turkey and in the EU countries. Like the most EU countries, Turkey started ICT-related initiatives as early as 1984. Especially in 1988-1989, some plans and decisions were made which were related to "preparing and integrating curricula, software design and development, training of teachers, and acquiring hardware and incentives to produce hardware components locally" (Yıldırım, 2001). In spite of facing great educational challenges, Turkey has taken major steps to catch up with the EU standards in integrating ICT into its educational system. However, there is no standard system either in the EU countries or in Turkey.

At the primary level, the study of ICT has now become an integral part of the minimum compulsory curriculum in many countries in the EU. This study covers a broad range of skills, extending from the use of various software packages to communication via a network, and also CD-ROM or network-based information searches. On the other hand, in Turkey, the study of ICT is not yet included in the compulsory curriculum in primary education. Only elective courses are available.

A majority of teachers make use of ICT in the course of their teaching on a regular basis in the European Union. Among these teachers, 71% at the primary and 60% at the secondary level indicated that they used ICT with their pupils on a fairly regular basis (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 cities in Turkey claimed to have used computers once a day or more. They think they have enough computer literacy, and they have positive attitudes toward computers. However, they do not use computers for instructional purposes (Çınar, 2002). Barksdale said, "unfortunately, most schools of education are graduating teachers who are ill-equipped and unprepared to meet this challenge" (cited in Carbonaro, 1997, p.255). In line with Barksdale's statement, most likely, the teachers in Çınar's study were not prepared to integrate technology into teaching in both pre-service and in-service education. They very likely lacked the necessary facilities, materials, and support.

In over half of all EU countries, ICT has become a compulsory part of the curriculum for the pre-service education of teachers in both primary and secondary education. However, as regards the pre-service education of secondary school teachers, for whom data is available, official recommendations on the subject of ICT training are often general and specify only the compulsory nature of work on ICT during pre-service education. In most EU countries, minimum requirements concerning the amount of time to be devoted to the subject do not exist. Recommendations on the applicable content during pre-service education are more frequent; an equal importance is generally attached to both acquiring a practical command of ICT for personal use and to acquiring mastery of it for teaching purposes (EURYDICE, 2001a).

In Turkey, similar to the practices of EU countries can be seen in the integration of ICT into pre-service teacher education programs. The Higher Education Council has developed the new teacher education curricula for schools of education. According to the new curricula, two ICT related compulsory courses were included in the teacher education programs. Even though including these courses into the curricula is the first attempt at preparing Turkish pre-service teachers to use computer technologies in the classroom, this effort should go beyond the mere training of teachers in basic computer skills. Vagle, White, and Dugdale argued that "the answer to inadequate preparation of pre-service teachers is the development of teaching methods courses which require students to incorporate technology-based

methodologies in their respective teaching fields” (cited in Betz & Mithcell, 1996, p. 182). In line with their statement, Yıldırım (2000) indicated that 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, the content of “Methods of Teaching” courses can be reorganized to introduce new teaching methods, including those incorporating computers. As a result of this reorganization, faculties of education will not only be training pre-service teachers in technology; they will also be training pre-service teachers to teach with technology.

Also according to Yıldırım (2000), the provision of teachers with equipment is an important factor in integrating ICT into education. The Multimedia Portables for Teachers Pilot Project in the UK also showed that once teachers have uninterrupted access, they become more inclined to invest their time outside of school in order to build their own ICT skills (BECTA, 2001). In 2005, Ministry of Education has started “notebook for every teacher campaign,” but teachers have to buy their own notebook with long term and low interest rate loan.

Implications for Practice in Turkey

There is currently little solid evidence that Turkey is re-examining its curricula and programs to effectively integrate new digital electronic technologies. Ideally, comprehensive plans for implementing ICT should begin with learning targets related to the curriculum. Linked to this, ICT should be an integral part of the compulsory curriculum in primary education. For this purpose, new policies should be made and implemented.

Even though some revisions were done, primary education curricula are too loaded in Turkey, and by the end of the school year teachers try to finish the content indicated in the curriculum. Because of this situation, most teachers lack sufficient time to implement new strategies and to integrate new technology. In order to allow teachers to integrate technology into education, the primary education curriculum needs to be redesigned. Teachers must be provided with technology integrated teaching/learning activities, and they should be given more time and help to implement new strategies and activities.

Another issue to be considered is the technological facilities provided for the teachers’ use. As of October 2004, 11.728 primary schools (%45) had access to the Internet by ADSL technology, and 4.002 computer labs established in 3000 primary schools under the second phase of basic education project (MEB, 2006b; MEB, 2006c). Although technological facilities and access to the Internet are increasing, in most schools in Turkey, teachers have difficulty in accessing computers and the Internet. In order to improve this situation, Turkish schools should be more thoroughly computer-equipped, and the teachers’ weekly workload should be lowered.

Isolated ICT courses in teacher education programs can help to develop ICT competency, but alone, they cannot help to increase the use of technology in teaching. Teacher education programs need to be redesigned to integrate ICT into the “teaching methods” courses. During their practice teaching periods, prospective teachers will then be able to find new ways to implement what they have learned. They can also be evaluated based on their implementation.

The integration of ICT into the educational system requires government intervention in setting the frameworks. The EU countries all agreed that by the end of 2002, all of their teachers should be skilled in the use of ICT technologies and possess broad digital literacy (EUROPEAN COMMISSION, 2002b). Though Turkey has some plans in regard to this issue, there is need for these plans to be put into action. Pedagogical use of ICT as well as basic training for beginners will be needed in both pre-service and in-service teacher training. Approaches like the use of peer support, personal access to technology, and provision of the opportunity to learn from more skilled teachers can be employed in in-service teacher training. Specific measures need to be taken to ensure that ICT use is covered in all pre-service education courses and that all serving teachers have access to appropriate in-service training that responds to their individual needs. Although there is a required computer literacy course for all pre-service teachers in Turkey, the need to provide more courses concentrating on ICT to promote teaching with computers in the classroom must also be recognized.

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