TÜRK FEN EĞİTİMİ DERGİSİ
Yıl 4, Sayı 2, Eylül 2007

Journal of
TURKISH SCIENCE EDUCATION
Volume 4, Issue 2, September 2007

http://www.tused.org

Information And Communications Technology (ICT) In Initial Teacher Education: What Can Turkey Learn From Range Of International Perspectives?

Taner ALTUN[1]

[1] Assist.Prof.Dr., Karadeniz Technical University, Fatih Faculty of Education, Primary Education, Trabzon

Received: 20.02.2006 **Revised:** 21.04.2007 **Accepted:** 17.05.2007

The original language of article is English (v.4, n.2, September 2007, pp.45-60)

ABSTRACT

This study aims to review the strategies of preparing pre-service teachers to use new technologies to enhance subject matter training in teacher education (ITE) programs in various contexts, and intends to come out with the some possible ways of pedagogically appropriate integration of Information and Communications Technology (ICT) into Turkish ITE programs. Through the literature review, perspectives from German, British, American, Japanese and Turkish ITE programs are examined in terms of the diffusion of ICT and as a result general strategies of integrating ICT into the ITE programs are articulated. Literature suggests that there are four essential factors which need to be taken in to consideration when ICT is intended to be implemented into ITE. These vital factors are; ICT infrastructure and physical resources, curriculum and policy development, training lecturers and pedagogical training of teachers in ICT. At the end of the paper, a critical analysis about pedagogically appropriate integration of ICT into ITE programs is made.

Keywords: Initial Teacher Education, Information and Communications Technology, Pedagogy.

INTRODUCTION

We live in a technologically fast-changing world. We are already witnessing some of the significant social and economic consequences of Information and Communications Technology (ICT) and its impact on education. It affects parents, children, and schools. Some parents become anxious if their children do not use computers because they believe that the computer is a powerful educational tool. They may fear that their children will fall behind those who use ICT or worry that their children are not being adequately prepared for the future (Setzer & Monke, 1995). This fear also reflects the societies' expectations from the education, and therefore, reasonably the goal of education would seem to be that of equipping children with the necessary basic skills and knowledge in using this technology for the future better employment opportunities. As well as parents,

expectations of politicians and employers also have been rising, of what schools should accomplish in terms of student achievement as we take further steps into the information age or the knowledge society (Hargreaves, 1999).

Under those circumstances, the teaching profession comes under pressure and becomes even more difficult job. Today, a lot of instructional packages are offered to teachers, from traditional tutorial software to multimedia and hypermedia packages that come on CD-ROMs and laser-discs, and required to use in the classroom (Willis & Mehlinger, 1996).

It should be accepted that teachers are vital players in any initiative aimed at improving teaching and learning processes. Moreover, ICTs at schools will have little impact if teachers are not actively involved in all phases of their integration to the curriculum (Hepp *at. al* 2004). Therefore the role of teacher at this point is vital. It is known that teachers do not have time to thoroughly evaluate the educational strengths and weaknesses of a considerably portion of the existing curriculum materials, software and texts before they are used (Apple, 1992). However, teachers are required to decide how to make appropriate educational use of ICT in the classroom, where there are no longer lecture-based or didactic teaching methods in classrooms any more. In other words, teachers need to upgrade their skills and knowledge in the field of ICT as well as in other subject fields. In this respect Hargreaves (1999:123) points out:

> "It is plain that if teachers do not acquire and display this capacity to redefine their skills for the task of teaching, and if they do not model in their own conduct the very qualities - flexibility, networking, creativity - that are now key outcomes for students, then the challenge of schooling in the next millennium will not be met."

Although the possibilities for using ICT as a tool for teaching and learning in schools had increased in recent years, much empirical research evidence demonstrate that those possibilities were not being exploited by teachers (Willis & Mehlinger, 1996). Apple (1992) critically argues that the more the new technology transforms the classroom in its own image, the more technical logic will replace critical political and ethical understanding by means of loss of educational value of technology. However, teachers need to be trained in following areas: **a)** personal skills in use of ICT, **b)** professional skills and competence in ICT, such as understanding the relevance of ICT in education, understanding the importance of ICT in teaching and learning, understanding how to plan ICT for teaching and learning across the curriculum, and managing ICT in the classroom (Altun, 1997). The Initial Teacher Education (ITE) institutions are the places where those skills can be attained. Because, an individual could take a computer class from a local college or could take an ICT workshop in a conference, but neither of these would familiarise him/her with how to use ICT for teaching (Maeers *et.al,*1999). Therefore, educating teachers in effective use of ICT in the classroom needs to be started from the pre-service education. In this regard Maeers *et. al.* (1999:2) express:

> "…student teachers need to know about ICT and about what ICT can provide. They also need to be able to critically evaluate and discriminate what (technological) resource to use, and whether one should be used at all. They need to be able to understand conceptually and in pedagogically-appropriate ways, how, where and why to use computer related technologies".

In the light of these, this study aims to investigate the place of ICT in Initial teacher Programs in different countries on the basis of literature review. The paper breafly examines the models of ICT integration models adopted by a range of ITE programs

around the world in order to sketch out some of the possible integration strategies for Turkish ITE programs. The paper

1. ICT Integration Efforts in Teacher Education in Different Contexts

In this part of the paper, the efforts of integration ICT in teacher education programs in different countries will briefly be articulated under the lights of theoretical underpinnings of ICT and ITE. Only four developed countries (Germany, UK, USA and Japan), and a developing country (Turkey) were selected to examine the place of ICT in ITE programs. The, particular intention here is to seek answers to these questions: What are the current conditions in those countries regarding ICT and ITE, *what* they teach to student teachers, and *how* they teach about ICT? In short as Willis and Mehlinger (1996) assert 'we need to know much more about *what* is taught in *which* classes using *what* methods.' Now, German, British, American, Japanese and Turkish contexts will briefly be examined in turn.

1.1. Germany

According to Gorny (1995), from the 1988, as in other Western European countries, in Germany also there have been strong debates about the impact of the computers in education and its place in schools.

In 1988 the broad concept of Information and Communications Technology (ITG) were started to being discussed between ministries of education, and schools. After four years of discussion it was agreed that ITG should be introduced to education and the importance of the new technologies for the future growth of the country was stressed and a computer literacy education for all pupils were demanded.

Today in all general schools ITG has been adopted as an underlying or overt course concept. Normally ITG begins with an introduction to computer handling, often with some programming and continues with applications in various subjects - mathematics and physics, sometimes biology and geography (using databases and spreadsheets) and less commonly foreign language teaching (with the use of electronic mail). At teacher education, unlike the other countries pre-service education for teachers is offered by universities and teacher training colleges but with separate curricula for separate types of school careers. Yet, each teacher education programme has its curriculum, which is different from the others.

In Germany, education in the teaching of ICT is one of the core curriculum options. Consequently, the institutions of teacher education concerned are obliged to offer the subject, but it is left to the trainees to decide whether or not to include it in their overall course of education. This applies to the initial education of primary and secondary school teachers (Eurydice, 2004).

Many teacher education institutions offer courses in informatics - very few in ITG - but practically all courses are optional and never exceed 10% of the student population. Therefore, most novice teachers do not have a systematic introduction into the use of computers in education, although they might have acquired some practical knowledge on their own by using computers as a personal tool.

In Germany, training in using ICT in education is widely provided by in-service training rather than pre-service training. In-service training consists of two models: *cascade* model and *permeation* model. In the cascade model, in the one case a small number of trainers are trained first and these are used to train a larger, more widespread layer of trainers and so on. It is efficient, but while programming skills are safely

transmitted by the cascade, on the other hand pedagogical considerations and such matters as the societal and organisational aspects of IT tend to get lost.

The *permeation* model depends on the spreading of knowledge and skills by contact at the level of the practitioners in the schools system; interested teachers are trained and afterwards encouraged to spread their knowledge 'by example' to colleagues and pupils. The weakness of this model is its unreliability. It is difficult to measure that certain number of teachers will have acquired a well-defined canon of knowledge and skills at the given point in time when a curriculum becomes compulsory (Gorny, 1995).

1.2. United Kingdom

In the UK, teacher education, and education in general, are controlled by the central government. Hence, the changing role of ICT in teacher education is determined by the government. The first serious attempt to integrate ICT in teacher education programs imposed by government in 1989. The Department of Education and Science (DES) 1989 report require that:

> ".. all courses should contain compulsory and clearly identifiable elements which enable students to make the effective use of information technology (IT) in the classroom and provide a sound basis for their subsequent development in this field." (DES,1989, parag. 6.6)

The above report was suggesting a constructivist use of IT (paragraph, 6.6) in teaching and learning. However, since then the UK teacher education programs have responded to the government's criteria by using different IT integration models in their courses. Therefore, the quality of training models related to use of ICT in teaching and learning varied from course to course.

To date, much has been achieved in ICT integration in teacher education and in education in general. In-service training courses were increased to support the effective use of IT in the classrooms. Wealth of hardware and software supplied by either industry or by the government. Today, the UK is the only country in most developed countries, which includes IT in its National Curriculum, and the only country to have at least one computer in all of its primary schools and having best pupil to computer ratio in secondary schools. However, teachers' professional development in the use of ICT in teaching and learning is surprisingly still low (Denning & Selinger, 1999).

In order to, raise the standards in teacher education programs in terms of effective training in the use of ICT in educational purposes, in 1998 the *Initial Training National Curriculum for the Use of Information and Communications Technology in Subject Teaching,* (DfEE, 04/98) was issued by the central government. With this curriculum, attention is directed to at ICT in Pre-service teacher education, rather than concentrating on in-service courses (Fisher, 1999). It is also the basis of the 'expected outcomes' of the in-service programme of 'New Opportunities Fund' (NOF) training. This curriculum focuses on more pedagogical competences of teachers about the use of ICT, rather than on skills, which pupils' National Curriculum which is mainly skills based. It can be seen that pre-service teacher training in the UK became a competency based model in recent years with focusing on core skills (Denning & Selinger, 1999).

1.3. United States

In the USA, for nearly last two decades, computers and other information technologies are used in K-12 education in a number of ways to aid teaching and learning. Those ways are;

- **IT-assisted learning:** includes three different uses of IT to support learning. 1) Computer-assisted learning, 2) Computer-assisted research, 3) Distance learning.
- **Technology as a tool:** This includes a large number of hardware and software that supports to extend peoples abilities to do work. In addition IT tools are used to support constructivist education.
- **Computer and information science**: This is a special area for people to study technology (Milken Exchange on Educational Technology Report, 1999)

At **teacher education** level, from the date of 1957, teacher-training institutions addressed professional development need for technology through in-service training programs. The above report documents that up to date of 1995, the amount of ICT in K-12 education and in teacher education institutions has increased rapidly. The only problem was the need for improvement in the use of ICT, rather than provision of ICT. In 1995, the requirement of the national standards for the integration of ICT in teacher preparation programs was concerned. The National Council for Accreditation of Teacher Education (NCATE), in co-operation with the International Society for Technology in Education (ISTE) produced a National Guidelines for the use of technology in teacher preparation programs and implemented (NCATE, 2005). The areas in the NCATE in associated with ISTE accreditation standards with expectations for knowledge and the use of technology as follows:

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.* **(http://cnets.iste.org/teachers/t_stands.html)**

Briefly NACTE's standards expect candidates to "complete a sequence of courses and/or experiences to develop an understanding of the structure, skills, core concepts, ideas, values, facts, methods of inquiry and uses of technology for the subjects they plan to teach."

In terms of Professional and Pedagogical Studies, NCATE expects that candidates acquire and learn to apply knowledge about:

- The impact of technological and societal changes on schools, and acquire an understanding and use of
- Educational technology, including the use of computer and other technologies in instruction, assessment, and professional productivity.

According to Moore *et al.* (1999) study, in the USA those standards based on teachers competencies in four major categories: Pre-requisite Technical Skills, Technical Skills, Instructional Uses, and Teachers' Professional Roles.

However, still colleges of education, where teachers are trained, typically lag behind the public sector and K-12 schools in terms of technology implementation (Schrum & Dehoney, 1998). Findings of a most recent national survey (Milken Exchange on Educational Technology, 1999, p.2) on Information Technology in Teacher education in the USA indicates;

- In general, the technology infrastructure of education has increased more quickly than the incorporation of IT tools into teaching and learning
- Most teacher preparation programs do not have a written, funded, regularly up-dated technology plan.
- Most student teachers do not use technology during field experience and do not work under master teachers who can advise them on IT use.
- Teacher educators in the preparation programs do not model information technology use for candidates.

1.4. Japan

According to Sakamato and Gardner (1995), in Japan, the idea of "IT in education" began to appear in 1985 with the several influential reports on this agenda. The Task Force on Primary and Secondary education issue a report in 1985 on how computers should be introduced into different levels of schools. The primary goals were to familiarize primary school pupils with computers through their use as teaching tools, to enable lower secondary school pupils to develop computer awareness and literacy through the greater use of simulations and information management packages; and to enable upper secondary pupils to consider the progress of the development of an information society and its impact on both individuals and society as a whole. Hayashi (2003) emphasizes that "Information Education" initiated by the Japanese government in 1985 aimed to bring up abilities to use information that is called "Information Utilized Abilities" taught in every related subject and activity systematically through all stages of school education. In addition Hayashi (2003) contends that ""Integrated Study" is one of the subjects for information utilized abilities and problem solving learning with social constructivism. In the elementary, secondary and higher education of Japan teachers and learners have developed the effective use of ICT in Integrated Study" (p.1).

On the one side Japanese government allocate considerable amount of money to provide necessary equipment, hardware and software for schools, on the other side, the official departments tried to create a curriculum for schools, which includes IT in it. In 1989 a new National Curriculum called "Course of Study" was issued. In this curriculum, elements such as pupils' competence and familiarity with IT, their ability to select appropriate IT applications for various tasks, and their understanding of its implications for society and the individual are covered.

Those school-based changes required complementary changes in teacher education. From the 1988, preparatory training began to given through the in-service training programs. The Ministry, rather than the university departments, provided these courses.

For Pre-service training in 1990, by the Education Certification Law, all new teachers required to study a course on Educational Methodology and Technology. This course aimed to develop pre-service teacher's competence in the use of information and instructional media.

Recently, Japan created a new profession, which called *'The Educational Engineer'* whose skills include being able to:

- Develop teaching plans for other people;
- Transfer educational knowledge and techniques to others;

- Make presentations and report using technical writing;
- Develop high quality educational materials such as multi-media materials using IT (Sakamato & Gardner, 1995).

At the faculties of education, Japan has pre-service and in-service teacher training programs today in order to educate teachers for effective implementation of ICT in schools. "Educational Media" is a subject for bachelor course, carried out through "Learning by Doing" method in order to create good communication between teachers and learners. The students acquire the theory and practice communication system in a class from the viewpoints of (1) verbal, (2) non-verbal and (3) media utilization (Hayashi, 2003).

1.5. Turkey

Computers were first introduced to Turkish schools in 1984 by the initiation of a Computer-Aided Education (CAE) Project, which took shape between 1984 and 1986. The initiator's (Ministry of National Education (MONE)) aims were to spread computer literacy and the use of computers as one tool to compensate for the poor quality and persistent deficiencies of suitable teachers (Yedekcioglu, 1996).

Since then, MONE has allocated considerable money for spreading the use of ICT in education with a number of projects. These include upgrading the curricula and instructional materials, revising student achievement tests, improving the teacher training system, and increasing the research component in education (Schware & Jaramillo, 1998). In order to support these efforts, in 1992, an official organisation created by the MONE, which is General Directorate of Computer Education and Services (BILGEM). Activities such as planning the use of computers in education at every level and type of school, training operating personnel, improving Computer Aided Instruction (CAI) parallel to technological advancements, and performing tasks related to information processing are among the main responsibilities of BILGEM (Ozar & Askar, 1997). BILGEM also carried out a successful project (Computer Experimental Schools) in schools between 1992 and 1995, where 53 schools were selected and provided required hardware and software, and approximately 250 teachers have been trained in the use of those computers and educational software. However, ICT is not being implemented in the National Curriculum yet. ICT still does not exist in the National Curriculum either as a core subject or as a part of the core subjects or other foundation subjects.

In parallel with the schools, the government concerned the need for change and improvement in teacher education institutions. As part of the National Education Development Project (NEDP), which was sponsored by Turkish Government and the World Bank, education faculties provided IT equipment and necessary hardware and software facilities in 1998. With the Higher Education Council's (YOK) Restructuring Attempt in Education Faculties in 1998, the teacher training curricula revised and a new department in education faculties created. In the new programs, courses about Information and Communications Technology and its uses in teaching and learning will be provided to improve the quality of teachers. In short, the curriculum of each ITE program was reformed, from theory-laden courses to more practice-based courses (Alev, 2003). Computer and Instructional Technology Teacher Training Department is aiming to provide in the first place IT co-ordinators for schools, and then later ICT literate teachers for all state schools. Similarly in other program, two courses are included. The contents of those courses are as follow:

1. **Computer:** Basic Keyboard skills, word processing, graphic, spreadsheets, working with database programs, basic programming applications, software reviewing and evaluation, working with computer in the classroom.
2. **Instructional Technologies and Material Development:** Characteristics of various instructional technologies, the place of instructional technologies and their use in teaching process, development of teacher materials (e.g. spreadsheets, transparencies, slides, video, computer based materials) and evaluation of various types of teaching materials through instructional technologies (YOK, 1998).

As can be seen, the first one provides basic personal skills for student teachers and second one seems more concentrated on professional skills related to ICT. If we look at the assessment criteria in ITE programs, generally we can see that Turkish ITE is on behaviourist approach. Those courses would seem to a national guide for education faculties in terms of integrating ICT in teacher education programs, which is not a standard curriculum for ICT education. Although those courses provide a framework to teacher educators about what should be taught regarding to ICT, but they do not specify how it should be taught to student teachers in order them to utilize ICT for pedagogical purposes in the classrooms.

Despite those changes, Turkish Teacher Education Institutions still suffer from the lack of appropriate integration of ICT in the programs. Although courses related to computers were included in ITE programs by the YOK, teacher educators' lack of experience and competence in ICT is the biggest constraint at the moment. Altun (1996) notes that computers are often locked in rooms waiting for professional users or trainees. Altun (2002) found that the majority of the teachers are at the early stages of technology adoption and pedagogical integration of ICT is yet to be accomplished in some schools even though there was an improvement in the use of technology in general.

2. General Strategies to Integrate ICT into ITE Programs

The previous section articulated the ICT integration efforts into ITE Programs in different countries. As we can see, like many other countries Germany, USA, UK, Japan, and Turkey recognized the future and developed strategies and models to integrate ICT into education system and teacher education system as well. There are some similarities between strategies as well as differences. For instance, in all countries we see that there is no systematic introduction for student teachers into the use of ICT in education. Yet, there is a common strategy that all countries trying to develop compulsory courses for teachers and moving towards a standardized curriculum, which specifies acquired skills and competences in ICT training in teacher education courses. On the other hand, in the UK, USA an in Turkey much more emphasis is given to pre-service education in the field of ICT, while in Germany in-service models are widely in use. Although integration strategies in different countries vary depending upon the level of development, the main idea underneath those strategies is to keep educational systems up with the recent rapid technological and global improvements for the future information society. As the recent survey reveals, we can say that the barriers for integration of ICT tend to be divided into two groups: external and internal. External barriers include a lack of equipment, unreliability of hardware and inadequate technical support. Internal barriers often comprise school-level factors, such as lack of training (specifically in integrating technologies) and organizational culture, and teacher-level obstacles, including confidence and personal beliefs about the value of technology in their subject (Milken Exchange on Educational Technology Report, 1999).

Apart from above issues, the main concerns also relating to ICT integration in education and teacher training in all countries derive from following main areas, which are vital factors and need to be examined more deeply;

- ICT infrastructure and Physical Resources
- Curriculum and policy development
- Training lecturers
- Pedagogical training in ICT

2.1. ICT Infrastructure and Physical Resources

Eraut (1989) asserts that in integration of IT into education process, priority should be given to developing an ICT infrastructure within the educational system, which can respond flexibly and with increasing capability and capacity to new opportunities and policy changes. Generally, as can be seen from our example countries, firstly they started to overcome the problems, which are related to provision of hardware and software in educational organisations. In a great extent, the developed countries (Germany, UK, USA, and Japan) overcame the provisional problems of computing, and developed an infrastructure for computing in schools, and now they are much concerned with how to utilize those hardware and software to support teaching and learning. Yet, developing countries are still struggling to meet the demands of computing in schools in terms of quantity of hardware and software, which is directly linked to economic position of country. Turkey, for instance, is currently trying to develop a computer infrastructure in all education faculties by developing clusters, computer labs and Internet services. However, such funding is hard to obtain given the economic situation in Turkey.

One interesting point also here is worth to make that when we look at our example countries, in Turkey, unlike the other countries developing infrastructure in education faculties is the first step for educational computing. On the contrary in other countries, they build ICT infrastructure in schools first then concerned teacher education institutions. It can be argued that if there are not enough resources in schools it makes little sense to train teachers to use such technology for teaching and learning. On the contrary, even if there is well-established infrastructure in schools but not enough trained teachers in using this technology for educational purposes, again leads us to a *cul de sac*. However, today's practice seems to take the second kind of way to integrate ICT in education.

2.2. Curriculum and Policy Development

In was mentioned that our example countries trying to develop a standard ICT curriculum for ITE courses. However, one of the challenge to integrate ICT both in education and teacher education is, how to decide priorities between aims and how to accommodate these new opportunities within a curriculum. Eraut (1989) points out that the decision-making process involves:

- deciding what priority should be given to each curriculum goal,
- choosing between different curriculum approaches to achieve the selected goals,
- assessing how much can be achieved by a particular approach in any given context (p.13).

When looking at the examples, the process of deciding **what should** be taught and **what should not**, has been taken a long way in all countries. However, in the UK, recent National ICT Teacher Training curriculum identifies the standards, and clarifies the objectives and skills in teacher education for ICT. But on the other hand, in other cases, there are only general frameworks or guidelines (in Germany, USA, Japan, and Turkey),

which determines what should be taught related to ICT during their initial education. After deciding what should be taught, then we can understand more about how and what students learn from ICT, and compatible software can be produced in the same approach with the curriculum.

Besides, the approach, which a Teacher Education curriculum adopts, is a crucial factor in ICT integration process into curriculum. We see that the ICT curriculum in all countries tends to be **competency based**. Particularly the UK curriculum based on behaviourist approach while there are some aspects of cognitive-constructivist bits in it. The USA Standards again based on pre-determined skills and knowledge on the use of ICT. Perhaps, this is the result of standardisation in teacher education programs and centralisation. Teachers are now required to develop a range of general knowledge and skills in ICT as well as competency in using ICT in the classroom. This is, partly because of the increasing focus for consideration of effective uses of ICT is upon pedagogy rather than upon technology (Passey, 1998).

2.3. Training Lecturers to use ICT for Instruction

It was argued by Hayes and Jin (1999) that there are many challenges in teacher education programs to prepare an effective teacher for tomorrow's classroom. For instance, although the impact of computers on primary and secondary education continues to grow rapidly, the teacher educators in higher education continue to rely on more traditional methods for delivering instruction. In order to answer these challenges, lecturers in the teacher education courses must establish an ability to integrate modern technology with instruction. Teacher educators task should be to make sure that when ICT enters to the education or to the classroom, teachers know well and understand that it is there for politically, economically, and educationally wise reasons, not because of governmental requirement.

Altun (1996, p.194) argues that enhancing the quality of training for initial teachers is dependent upon:

- Their lecturers' familiarity with IT applications (hardware, software and associated technology) in their subject area;
- The experience of lecturers in developing necessary IT skills for teaching and learning in student teachers;
- The skills of lecturers for integrating the use of IT into their teaching with student teachers; and
- Provision of adequate facilities to support students' use of IT in the faculty, and in schools.

However, the opportunities for lecturers are limited to upgrade their personal and pedagogical skills and knowledge about the use of ICT. From our example countries, and other literature, it can be seen that the focus about use of IT in education is directed at either in-service training of teachers or pre-service training of student teachers in terms of developing required skills and competencies rather than lecturers. In the USA case for example it was reported that teacher educators do not model IT use for student teachers, which is very crucial point for educating future teachers. However, as in the USA case we also come across in other countries that there is no systematic introduction of ICT to use it in instruction for lecturers. Therefore, lack of implementation in this field is the result. In all countries also limited research has been carried out about lecturers' skills and competences in this field.

It is very interesting example that when Bollentin (1998) interviews a university professor in the USA. Professor believes that there exists fear of and resistance to technology in higher education "everywhere except with students." He also says

"university administrators look with wonder but don't know what to do with the work we create. They like the benefits, but so far at least, they hesitate to pay the cost." He says, faculty (lecturers) say two prayers a day: "One for the parking god to find a spot near their buildings and the other for the PC god so that their computers will boot for word processing and e-mail. That's it!"

2.4. Pedagogical Training of Teachers in ICT

OECD (1992) report identifies that two levels of knowledge and expertise required of teachers who are to use ICT in the classroom: these related to *hardware and software*, and the *pedagogical applications* of new information technologies. However, in most countries like the US, Japan, and Germany and some countries in the European community, the main focus of computer education in schools has been on computer skills, e.g. word processing or information management. However, little attention has been given to developing a **pedagogy,** which integrates the teaching of computer skills with an understanding of information technologies and its place in our society. Jurema *et al* (1997, p.3) strongly argue:

> "Little or no attention has been given to **Pedagogy** of Informatics, which takes into consideration learning and teaching processes, organisation of curriculum, and reflection on people/machine relationships in learning and in the wider community, as well as developing children's ability to use computers competently."

What do we mean by the pedagogical use of ICT? What are the main areas of pedagogical ICT skills for teachers? According to Passey (1998, p.1) teachers who become highly skilled in supporting pupils with ICT are skilled in three distinct areas:

1. they are clear about the intentions of the learning activity (for example, whether it is concerned with research, or with writing, or with editing, or with visual creativity);
2. they are clear about the cognitive outcomes of the learning activity (for example, whether it is concerned with acquiring knowledge, or with an analysis of particular material, or with a synthesis of material from a variety of sources);
3. they are clear about the management of classroom interactions (for example, when it is not appropriate to intervene, or what to intervene about, or why intervention needs to be employed at a particular time in order to refocus pupil attention on task).

Despite the clear need to prepare teachers for level of expertise (i.e. pedagogical applications of new information technologies in teaching and learning), in only a very few countries (e.g.UK, USA) such training is a compulsory part of pre-service teacher education programs. From our example countries we can only see quite serious developments in the UK teacher-training curriculum in ICT. The UK curriculum seems to focus more on the pedagogical skills of teachers, which needs to be improved. Others however, particularly German, Japanese and Turkish ICT related courses still tend to be skills on how to operate hardware or software, while US programs touches to pedagogy use in some phases of training. In addition, the foundation courses, which provides an understanding and knowledge about philosophical and sociological underpinnings of ICT in education, are missing in all our example countries' teacher preparation curricula.

3. Conclusions and Implications for Turkey

This study highlighted that there is a general consensus in the literature that ICT can help create better learning and teaching environments. ICT has the potential to contribute

to the improving of students' critical thinking, decision making, problem-solving skills and generating ideas with its integration into classroom activities. The teacher's role at this point is crucial. Because, this potential depends upon the teachers ability and willingness to integrate the technology into everyday classroom teaching activities (Pisapia, 1994). However, it is a challenging job. The challenge for teachers is to turn this inevitable intrusion - ICT integration - into a powerful tool for teaching (Hargreaves & Fullan, 1998). They need support as well as commitment, skills and knowledge to facilitate the learning as a source for gaining information and knowledge.

Initial Teacher Education institutions at this point have a crucial role in order to equip and prepare teachers to classroom; who are confident and competent about managing the change and influence it for the better quality of teaching. In addition, teachers always need to be familiar with the research literature, and have the opportunity to develop appropriate instructional strategies and encounter circumstances where they can practice and reflect on the pedagogy of using ICT in the classroom (Romeo, 1998). In short, all trainees should be trained to deal with the reality of every change (Fullan, 1991).

However, ITE courses are not very efficient to relate contents of the course with the real classrooms in terms of pedagogical use of ICT. One of the reasons for this is the misapplied instruction model in ITE courses. Within the behaviourist approach for instance, *didactic* or in other words *lecture based* instruction methodology is widely accepted teaching technique by the lecturers in ITE courses. However, as Risko (1998) argues that **lecture-based** instruction is ineffectual because it does not enable students to learn how to analyze the effects situational and classroom contexts on a classroom teacher's choice of method. It also inhibits student teachers' learning because it is very difficult to verbally describe the nuances and dynamics that occur when children and their teacher interact in classroom environments. This kind of instruction methodology forces student teachers to make sense of disparate experiences instead of being engaged commonly shared experiences requiring use of relevant knowledge to find solutions to target problems.

Particularly, this is very true for instructional methodology in Turkish Teacher Education courses. Because of the education system continues to have tradition of rote learning and memorisation, little emphasis placed on creative problem solving or application of information in new and different contexts (Bayram & Seels, 1997). In the ITE courses teaching is still based on textbooks or too often instruction for future teachers follows a pattern, which is simply told what experts know (facts) or how experts solve classroom dilemmas (procedures). So, by using lecture-based teaching method, it is very difficult to train student teachers in the area of use of ICT for education. More collaborative work and more hands-on activities should be integrated to instruction methodology. Student teachers should be encouraged to think and share ideas with others and produce possible theoretical and practical strategies about how to use ICT effectively in the classroom to make learning easier and enjoyable for pupils. However, I believe, both students and lecturers receive little guidance and training on pedagogic strategies, in spite of growing research evidence of their importance. In this regard Mhyre (1998, p.102) concludes:

> "We must address the use of computers together with the teachers' understanding of pedagogy and subject matter in order for the technology to play a significant role in improving our schools. If not, the investment in computer technology for our children's classrooms will end up as another example of a failed attempt to reform and renew our schools".

In a sense, in order to address the use of ICT together with pedagogy and subject matter, particularly in Turkey, primary concern should be placed on the making ICT as part of all subjects in both ITE curriculum and in the National Curriculum. Secondly, the curriculum needs to be rescued from traditional behaviourist approach domination and cognitive-constructivist approach should be introduced to the system, which is today internationally accepted and fast growing model in education systems. Perhaps only this way Turkey can train future teachers in the field of pedagogical use of ICT in future classrooms. If lecturers, also, do not use ICT in their teaching and do not model ICT in instructional activities again a talk on this topic is just only philosophy. A new ITE education model and/or a curriculum in ICT is needed that covers all individuals across the education faculty, which introduces ICT systemically and its impacts on individuals and on society, that is, which basically addresses the individuals' understanding of ICT. It also attempts to convince individuals why and how ICT should be used for educational purposes. Then training in basic skills in the use of ICT can start and moves towards to professional education.

Perhaps, Turkey's efforts regarding to integrating ICT into its teacher education system may require redesign of the system as a whole. But to me, apart from above issues, three major problems need to be solved too: 1) insufficient staff in the area of use of ICT in education, 2) insufficient access to resources, 3) lack of research in this field. Obviously, this is an educational change process and it is not an easy task to achieve. But, before starting to integrate ICT in the system Turkey should consider the criteria, on which Fullan (1991, p.63) draws; *Relevance* (practicality + need), *Readiness* (capacity + needs), and *Resources* (availability). First of all Turkey needs to identify and determine the present situation in the system, and then needs to follow international trends to see how other countries pass through these stages. Besides, through the research base, a model, which encountered earlier in previous paragraphs, for Initial Teacher Education needs to be developed to integrate ICT appropriately.

Particularly, in Turkey, there is an urgent need for a fast growing and relevant empirical research in this field in line with the integration process. In order to identify and determine the teachers', lecturers', and student teachers' readiness to adoption of a change, and illuminate the possible appropriate ways of ICT integration into education system, an empirical research base needs to be established. Today in Turkey a limited number of professional journals and books are produced and provided by universities. Even the limited research in this field is only based on either some literature review or on quantitative statistics and information about the number of computers in schools or number of servers purchased in which years so on. Therefore, professional development of teaching staff in teacher education institutions and in schools will remain a major obstacle in implementing ICT integration and new policies (Altun, 1996).

For instance, in order to understand and evaluate pre-service teachers' and supervisors' challenges with this integration process, there is a need for further empirical research (based on qualitative methods). In this way it is more likely to obtain more meaningful data, which provides a depth of understanding of the Initial Teacher Education ICT course processes, and effects on the participants, in order to inform whether participants are ready to change towards the Information Age, and inform what are the possibilities for participants to appreciate ICT in their learning and teaching. Because, participants concerns about the change process are vital elements in terms of implementation of a new strategy.

REFERENCES

Alev, N., (2003). *Integrating Information and Communications Technology (ICT) into Pre-service Science Teacher Education: The Challenges of Change in a Turkish Faculty of Education*. Unpublished EdD Thesis, University of Leicester, School of Education, UK.

Altun, E.H., (1996). Information Technology in Developing Nations: A study of Lecturers' Attitudes and Expertise with References to Turkish Teacher Education. *Journal of Information Technology for Teacher Education,* 5(3), 185-207

Altun, T., (1997). *Teacher Confidence in Using Information Technology: Reflections for Turkish Teacher Trainers,* Unpublished M.Ed. Dissertation, Newcastle, University of Newcastle upon Tyne, UK.

Altun, T., (2002). *Factors Influencing Teachers' Change in Classroom Practice Due To Introduction of Information and Communications Technology (ICT) in Turkey*, Unpublished EdD Thesis, University of Nottingham, UK.

Apple, M. (1992). 'Is the New Technology Part of the Solution or Part of the Problem in Education?' in Beynon, J. and Mackay, H. (eds) *Technological Literacy and the Curriculum,* London, The Falmer Press, pp.105-125

Bayram, S., & Seels, B., (1997). The Utilization of Instructional Technology in Turkey. *Educational Technology Research and Development,* 45(1), 112-121

Bollentin, W.R., (1998). *Can Information Technology Improve Education? Measuring Voices, Attitudes and Perceptions.* Educom Internet Publications, 33(1), http://www.educom.edu/web/pubs/review/reviewArticles/33150.html

Denning, T. & Selinger, M., (1999). *Patterns of Change and Innovations in Pre-service Education.* Paper Presented Annual Conference of SITE'99 (Society for Information Technology & Teacher Education), USA

Department of Education and Science (DES), (1989). *Circular 24/89 Initial Teacher Training: Approval of courses*. London, DES

DfEE, (1998). *Circular 4/98 'Teaching: High Status, High Standards,* London, DfEE.

Eraut, M., (1989). *The Information Society - A Challenge for Education Policies? Policy Options and Implementation Strategies.* Proceedings of Standing Conference of European Ministers of Education, 16th Session, Istanbul, Turkey, 11-12 October 1989.

Eurydice, (2004). Key Data on Information and Communication Technology in Schools in Europe, 2004 Edition, Online Resource,
URL: http://www.eurydice.org/ressources/eurydice/pdf/0_integral/048EN.pdf

Fisher, T., (1999). *ICT Capability of Entrants to a Postgraduate Pre-service Teacher Education Course.* Paper for ComNED'99 Conference

Fullan, M.G., with Stiegelbauer (1991). **The New Meaning of Educational Change**, London, Cassel Press.

Gorny, P., (1995). Teacher Education in IT in Germany, *Journal of Computer Assisted Learning,* 11, 40-45

Hargreaves, A. & Fullan, M., (1998). *What's Worth Fighting for in Education?* Buckingham, Open University Press

Hargreaves, D., (1999). 'The Knowledge-Creating School. *British Journal of Educational Studies,*47(2), 122-144.

Hayashi, T., (2003). ICT Use in Education and Teacher Training in Japan, Online resource. URL: http://www2.unescobkk.org/education/ict/v2_2/info.asp?id=14298

Hayes, L.D. & Jin, S.H. (1999). *Faculty Uses of Technology in Teacher Education* Paper Presented Annual Conference of SITE'99 (Society for Information Technology & Teacher Education), USA

Hepp, K. P., Hinostroza S. E., Laval M. E., & Rehbein, F L. (2004). *Technology in Schools: Education, ICT and the Knowledge Society,* World Bank Pub. Online Resource, URL: http://www1.worldbank.org/education/pdf/ICT_report_oct04a.pdf

International Society for Technology in Education (ISTE) (2000). Educational Technology Standards and Performance Indicators for All Teachers, Online Resource. URL: http://cnets.iste.org/teachers/t_stands.html

Jurema, A.C.L.A., Lima, M.E.C, Dalmau, M.C., & Filho, M.J. (1997). *Towards a Pedagogy of Informatics: Preparing Educators to Face the Challenge,* Paper Presented at the Annual Meeting of the American Association of Colleges for Teacher Education (49th, Phoenix, AZ, February 26 - March 1, 1997)

Maeers, M., Browne, N., & Cooper, E. (1999). *Pedagogically Appropriate Integration of Information Technology in an Elementary Pre-service Teacher Education Program,* Paper Presented Annual Conference of SITE'99 (Society for Information Technology & Teacher Education), USA

Mhyre, O.R. (1998). I Think This Will Keep Them Busy: Computers in a Teacher's Thought and Practice. *Journal of Technology and Teacher Education,* Vol:6 No:2/3, pp. 93-103

Milken Exchange on Educational Technology Report, (1999). *Will New Teachers Be Prepared to Teach in a Digital Age? A National Survey on Information Technology in Teacher Education,* [WWW document supply]
Online: http://www.milkenexchange.org/research/iste_results.html

Moore, J., Knuth, R., Borse, J., & Mitchell, M., (1999). *Teacher Technology Competencies: Early Indicators and Benchmarks,* Paper Presented Annual Conference of SITE'99 (Society for Information Technology & Teacher Education), USA

National Council for Accreditation of Teacher Education (NCATE), (1995). *NCATE's Current Standards for Technology and Teacher Education,* [WWW document] URL: http://www.ncate.org/projects/tech/currtech.html

OECD, (1992). *Education and New Information Technologies Teacher Training and Research: A survey of Co-operative Projects between Universities ands Schools,* Paris, OECD

Ozar, M & Askar, P., (1997). Present and Future Prospects of the Use of Information Technology in Schools in Turkey, in *Educational Technology Research & Design*, 45(2),117-124.

Passey, D., (1998, 12 November). *ICT and Effective Learning*, Proceedings of ICT Resource Conference and Exhibition, Doncaster.

Pisapia, J., (1994). 'Teaching with Technology: Exemplary Teachers.' Research Brief, Metropolitan Educational Research Consortium, Richmond, VA, USA, May 1994.

Risko, V., (1991). Videodisc-based case methodology: A design for enhancing pre-service teachers' problem solving abilities. *American Reading Forum, 11,* 121-137, (Eric Document Reproduction Service No. ED 340 002)

Romeo, G., (1998). 'The Impact of Computer Technology on Primary Education' in Townsend, T (ed) *The Primary School in Changing Times: The Australian Experience,* London, Routledge, pp.177-194

Sakamato, T & Gardner, J., (1995). Informatics in Teacher Education in Japan. *Journal of Computer Assisted Learning,* 11, 35-39

Schrum, L & Dehoney, J., (1998). Meeting the Future: A Teacher Education Program Joins the Information Age. *Journal of Technology and Teacher Education,* 6(1), 23-37

Schware, R. & Jaramillo, A., (1998). Technology in Education: The Turkish Experiment. *Information Technology for Development,* 8(1), 29-34

Setzer, V. W. & Monke, L., (1995). *Computers in Education: Why, When, How?* [WWW document] URL: http://www.ime.usp.br/~vwsetzer/comp-in-educ.html

UNESCO, (2005). Integrating ICTs into the Curriculum: Analytical Catalogue of Key Publications, UNESCO Asia and Pacific Regional Bureau for Education, ICT in Education Unit Bangkok, Thailand. URL: http://www.unescobkk.org/education/ict

Willis, J.W. & Mehlinger, H.D., (1996). Information Technology and Teacher Education. in, Sikula, J., Buttery, T. J., Guyton, E. (Eds) (2nd Edition) *Handbook of Research on Teacher Education, A Project of the Association of Teacher educators,* New York, McMillan Press, pp.978-1029

Yedekcioglu, O. A., (1996). *Uses of Computers at High Schools in Turkey*, [WWW Document], THE Journal Online Feature.
URL: http://www.thejournal.com/magazine/96/jan/feature4.html

YOK, (1998). *Eğitim Fakülteleri Öğretmen Yetiştirme Programlarının Yeniden Düzenlenmesi,* Ankara, Türkiye.