

## **CURRENT UTILIZATION OF ICT IN TURKISH BASIC EDUCATION SCHOOLS: A REVIEW OF TEACHER'S ICT USE AND BARRIERS TO INTEGRATION**

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### **ABSTRACT**

This study examined teacher's current use of Information and Communication Technology (ICT) in the Turkish basic education schools and investigated the barriers to effective technology integration. Data was obtained from 402 (97 female, 305 male) basic education teachers. Results showed that most teachers did not use ICT to promote pupils attainment in areas across the curriculum. Teachers reported using computers most frequently for preparing handouts and tests, and felt themselves most competent on word processing. The following study revealed that teachers felt overcrowded classes, inadequate inservice training, lack of timely technical and pedagogical support, inflexible school curricula, lack of incentives, lack of strong leadership, and lack of collaboration among teachers were the most detrimental factors to successful technology integration in schools. Finally, teachers' suggestions to overcome those barriers are also presented in this study.

### **INTRODUCTION**

There seems to exist a widespread agreement among researchers, practitioners and policy makers in the field of education that the use of Information and Communication Technology (ICT) ameliorates the teaching and learning process. Especially with the advent of the Internet, the Web has become the information repository for educators to advance their pedagogical skills. Nowadays, many benefits, including social, economical and pedagogical, are directly associated with ICT use in education. Evidently, in the knowledge society, ICT is considered as a key factor for economic growth and social wealth (World Bank, 2004). Thus, education institutions all around the world have been undergoing fundamental changes to meet the demands of the knowledge society and ICT has been functioning as a catalyst for this educational reform (McDonald & Ingvarson, 1997; Collins, 1991).

In the 21<sup>st</sup>, century, schools are expected to prepare individuals to be proactive members of the knowledge economy. Such expectation requires the future workforce to have necessary knowledge economy skills to be able to live and compete in the information age. For instance, the European Round Table (ERT) task force (2001) provided a list of policies and recommendations for the European Council to take actions to perk up the competitiveness of European countries through the knowledge economy. Some of those recommendations explicitly focused on the role and function of education in reshaping the future. The ERT recommended that the European Council should:

1. Set precise targets for knowledge economy skills and attitudes to be acquired by the minimum school leaving age.
2. Harness the experience of business for the benefit of education.
3. Begin the process of conferring a new status and value on the teaching profession.
4. Create a European on-line lifelong learning experience.
5. Agree that each government should produce a master plan, with targets and time-lines, to ensure that the knowledge society becomes part of every citizen's daily experience through electronic access to the full range of public services and information (p. 5-7).

In the same document, the ERT (2001) task force stressed the value of investments in the teaching process in terms of adequate preservice and inservice training for teachers, competitive salaries and adequate staffing levels for teachers (p. 5). Additionally, new citizens of Europe should have necessary knowledge economy skills, namely creativity, innovation, flexibility, team work and intellectual curiosity (p. 5).

ICT has profound implications for social and economic development, as well as acquisition of new knowledge economy skills. In line with the use of ICT in schools, the new pedagogy of learning defines new roles and responsibilities for teachers and students which promote the new skills required for knowledge economy. According to the new paradigm, learning is a dynamic and continual process that must be sustained and strengthened by a multiplicity of experiences from which students can then construct their own experiences and explanations (Jonassen, 1994). Students are not perceived as passive receivers of information; rather they are active participants in constructing their own meaning of the environment that they live in. Likewise, teachers are perceived as a guide or facilitator for students in this endeavor of constructing their knowledge (Sandholtz, Ringstaff & Dwyer, 1997; p.1-15; Watson, 2001, p. 182). In constructivist learning environments, students explore their environment, intellectually find solutions to problems in collaboration with other students and creatively construct their own knowledge of the world and share it with others. Needless to say, ICT is of great value in improving communication and collaboration among students and teachers, and in reforming teaching and learning tasks. We can now better value the role of ICT in endorsement of a new learning paradigm in education.

Parallel with the new pedagogy of learning, a teacher's role in the teaching

and learning process is more vital than ever before. They are evidently gatekeepers for all kinds of innovation introduced to the education system. Their attitudes and ingenuousness toward innovation mostly shape the echelon of adoption of technology in educational institutions (Preston, Cox & Cox, 2000). Even though teachers have been usually held responsible for the success or failure of ICT in schools, there are indeed a number of obstacles that impede the diffusion of ICT.

According to the report published by UNESCO (2002), there is continuum of approaches through which schools and education systems proceed in their adoption of ICT. Those approaches are named as emerging, applying, infusing and transforming (p. 14). Even though the ICT dissemination process in schools demonstrates an evolutionary attribute, inadequate preservice and inservice training is still a perennial difficulty for many teachers to integrate technology in their classroom teaching (Yildirim, 2000; Vagle & College, 1995; Yaghi, 1997). Teacher's underutilization of ICT in the class and their resistance to embedding ICT across the curriculum can be detrimental to attempts to introduce new teaching and learning technologies in education. Therefore, it is crucial to monitor teacher's ICT utilization and examine factors that contribute to their skeptical practices of teaching with technology.

### **Basic Education Project of Turkey**

In 1997, the Turkish government extended the period of basic education from five to eight years and initiated a reform project called the "Basic Education Program" (BEP), partially financed by the World Bank to meet the demands of the 21<sup>st</sup> century. In terms of its coverage (more than 10 million students, approximately 400,000 teachers and more than 35,000 schools) and its budget (13.5 billion USD), the BEP is currently one of the leading education projects of the world. One of the main objectives of the Basic Education Project, as stated in Project Appraisal Document (PAD) in 1998, is to increase the overall quality of basic education in Turkey. More specifically, the project is undertaken to achieve the following:

- (a) achieve universal coverage in an expended eight-year basic education cycle;
- (b) improve the quality and relevance of basic education; and
- (c) make basic education schools a learning resource for the community (World Bank, 1998; p. 2).

In order to improve the quality of basic education, in parallel with international practices, the Ministry of National Education (MONE) established 2,872 IT rooms (computer labs with audio-visual equipment) in 2,451 basic education schools throughout the country during the first phase of the project between the years 1999-2001. Following the establishment of IT rooms, the MONE provided in-service training for approximately 330,000 basic education school teachers and 2,250 IT room coordinators on ICT use in schools. Progressively, the MONE is still in the process of designing and implementing various activities to achieve the following objectives defined for the IT component of the BAP:

- (a) train IT coordinators, teachers and administrators in computer literacy and in computer-aided-instruction through inservice training;
- (b) provide a phased introduction of computer resource centers initially to existing schools in sub-provinces with high student population, then to regional basic educational schools, and subsequently to remaining basic education schools;
- (c) allow provision for Turkish educational courseware;
- (d) expand Internet connectivity and services in order to allow schools to be able to connect to one another and to Turkish educational Web sites; and
- (e) strengthen communication between IT coordinators, teachers, and universities through information bulletins, Web sites and annual, regional workshops to review best practices (World Bank, 1998: Annex 2; p. 8-9).

Currently, the MONE is initializing the second phase of the project which is planned to cover activities between 2003-2005. In the second phase, the MONE will spread IT rooms to 3,000 additional basic education schools by establishing 4,002 more IT rooms in those schools (World Bank, 2002). This implementation is planned to take place during the 2004-2005 school year. Meanwhile, the MONE will provide inservice training for more than 31,500 basic education school teachers to improve their ICT skills.

### **Purpose of the Study**

Even though the MONE is still ambitious in the second phase to increase the quality of basic education through the use of ICT in schools, it should be noted that the first phase ICT policies and activities of the project should be reviewed and assessed vigilantly, before leading up to the second phase. Zhang (2000) warned it was unlikely that misapplied technology would support the learning process; rather it would be "...more of a distraction than an asset." (p.475). Therefore, this study was conducted to:

- (1) examine the current utilization of IT rooms by basic education school teachers;
- (2) delineate the sources of problems that inhibit teacher's ICT utilization in schools; and
- (3) reveal teachers' ideas and suggestions in order to make a better and more efficient use of IT rooms.

## **METHOD**

### **Participants**

Participants of this study were basic education school teachers who participated in inservice training programs on "active learning strategies" organized by one of the state universities of Turkey in the 2001-2002 school year. The study used data from 402 (out of 450) basic education school teachers. Participants

were predominantly male (97 female, 305 male), of whom 33.7% were between the ages of 21-30, 36.9% were aged between 31-40, 27.9% were between the ages of 41-50, and 1.5% aged 51 or older. Of the participants, 125 (31%) reported owning a home computer and 46 (36.8%) had Internet access at home. Finally, 306 (76.1%) reported having taken previous preservice and/or inservice training on ICT use.

## Instruments

### Type and Extent of Computer Use Questionnaire

A questionnaire was distributed to collect evidence about the teacher's computer use and frequency of use. This scale was originally developed by Dusick & Yildirim (2000) and adopted for this study. Teachers were asked to rate the extent of their computer use in the following common areas: creating tests and handouts, homework assignments, administrative tasks, grading, testing and evaluation, demonstration and simulations, drill and practice, tutorials, and Internet search. This questionnaire had 9 items rated on a Likert-type scale of 1 to 4 where 1 represented (*Never*) and 4 represented (*Daily*). The scale was found to be a reliable measure of type and extent of computer use ( $\alpha = 0.82$ ).

### Computer Competency Scale (CCS)

This scale was originally developed by Yildirim (2000), with eight categories of computer applications commonly used by teachers and adopted for this study. On this scale, teachers were asked to rate their competency in following areas: (1) word processing, (2) database applications, (3) spreadsheet use, (4) presentation software use, (5) Web browsing, (6) telecommunications use, (7) educational software use, and (8) desktop publishing. The questionnaire used a Likert-type scale of 1 to 4 where 1 represented (*Not Familiar*) and 4 represented (*Competent*). For this study, the reliability was calculated as ( $\alpha = 0.79$ ).

### Follow-up Questionnaire

Teachers were asked if they were interested in participating in a follow-up study. Of the teachers, 126 teachers out of 402 agreed to the follow up study and requested the follow-up questionnaire to be mailed to them, thus the second phase of data collection was completed in 2002. Of the respondents, 72 teachers (46 male, 26 female) returned the questionnaire. This questionnaire consisted of 4 open-ended questions focusing on the following areas:

- Current condition of IT rooms and quality of technical services;
- Quality of pre and inservice IT training teachers received;
- Common obstacles that prevent teachers from integrating ICT in their teaching; and
- Teachers' ideas and suggestions regarding the strategies to overcome the barriers to effective ICT integration.

## FINDINGS

### Type and Extent of Teacher's Computer Use

Table 1 presents the type and extent of computer use by teachers. Of the participants, 49 (12.1%) teachers did not fill out the questionnaire because they stated they did not use computers for any purposes stated on the questionnaire. Results indicate that teachers used computers most often for preparing tests and course handouts for students ( $n=283$ , 87%). The second highest computer use frequency was reported for homework assignments. Of the respondents ( $n=312$ ), 215 teachers (69.9%) indicated that they used computers for homework assignments to some extent. Another interesting finding was that although the Ministry purchased a number of instructional software packages delivered along with computers, more than half of the population (59.9%) never used those software packages in their instruction. Only a very small portion of teachers reported using instructional software regularly to enhance their classroom teaching (approximately 6.6%). Finally, teachers reported using computers least frequently for grading (38%) and administrative tasks (38.6%).

TABLE 1. TYPE AND EXTENT OF COMPUTER USE BY BASIC EDUCATION SCHOOL TEACHERS

USE TYPE	TOTAL		FREQUENCY							
			Never		Sometimes		Often		Daily	
	N	%	N	%	N	%	N	%	N	%
Creating Tests & Handouts	325	92	42	12.9	185	56.9	62	19.1	36	11.1
Homework Assignments	312	88.3	97	31.1	126	40.3	59	18.9	30	9.7
Administrative Tasks	320	90.6	196	61.4	101	31.7	16	5	6	1.9
Testing & Evaluation	304	86.1	167	54.9	108	35.6	22	7.2	7	2.3
Grading	300	85	186	62	87	29	27	9	0	0
Demonstration & Simulation	332	94	183	55.1	132	39.8	15	4.5	2	0.6
Drill & Practice	330	93.5	192	58.1	115	34.9	14	4.2	9	2.8
Tutorials	334	94.6	200	59.9	112	33.5	22	6.6	0	0
Telecommunications (e-mail, web)	326	92.4	155	47.5	120	36.9	41	12.6	10	3

### Teacher's Perceived Computer Competency

Teachers were asked to rate their perceived competency levels on commonly used computer applications. Means and standard deviations of teacher's self perceived computer competency are presented in Table 2. As presented in table 2, teachers rated themselves most competent on Word Processing ( $M=3.12$ ,  $SD=0.88$ ), whereas they scored lowest on instructional software use ( $M=1.86$ ,  $SD=1.08$ ). Respectively, teachers felt themselves more competent on presentation software ( $M=2.62$ ,  $SD=1.06$ ), spreadsheets ( $M=2.59$ ,  $SD=1.01$ ), telecommunications ( $M=2.52$ ,  $SD=0.98$ ), database ( $M=2.1$ ,  $SD=1.24$ ), Web browsing ( $M=2.07$ ,  $SD=0.90$ ) and desktop publishing ( $M=1.92$ ,  $SD=0.92$ ). Overall, teach-

ers rated an average score ( $M=2.35$ ,  $SD=1.0$ ) on the perceived computer competency scale.

**TABLE 2. TEACHER'S PERCEIVED COMPUTER COMPETENCY**

APPLICATION TYPE	N	M	SD
Word Processing	402	3.12	0.88
Database	392	2.1	1.24
Spreadsheet	387	2.59	1.01
Presentation Software	394	2.62	1.06
Web Browsing	373	2.07	0.90 T
Telecommunications	360	2.52	0.98
Educational Software	354	1.86	1.08
Desktop Publishing	385	1.92	0.92
OVERALL		2.35	1.0

### Follow-up Questionnaire

In order to identify the factors which contributed to teacher's ICT use in schools and to reveal their experience with ICT and suggestions to overcome the obstacles that prevented them from the effective utilization of IT rooms, a questionnaire with 4 open-ended questions was distributed to 126 teachers who agreed to participate voluntarily. Of those volunteered, 72 (57.1%) of them filled in and returned the questionnaire. Throughout the following section, representative quotes from teacher's written responses will highlight the findings.

### Current Conditions of IT Rooms in Schools

The first question was posed to discover the current physical and technical conditions in IT rooms as well as teacher's current access. Teachers' responses ( $n=57$ ) to this question clearly indicated that the biggest impediment associated with access to IT rooms was overcrowded classrooms in schools. Teachers reported that the average size of classes they taught ranged from 45 to 55 students. From the responses it was evident that most teachers worked at schools with a student population of 600-800. For example, one teacher reported that "I have 58 pupils in my class and there are 20 computers in the IT room, half of which are usually not operational. We don't even have enough chairs for everybody... I also wonder if those rooms are furnished ergonomically." Similarly, another teacher pointed out that "... I have to put 4-5 pupils on the same computer... imagine the chaos in the class." A number of teachers ( $n=24$ ) wrote that scheduling of IT rooms was another problematic issue since most schools did not set up any acceptable usage policies yet. Teachers enumerated a wide range of causes for this problem, varying from "lack of administrator's vision on the use of IT rooms" to "lack of Ministry's guidance and regulations on how IT rooms should be operated". The following statement from one teacher illustrated the extent of scheduling confusion taking place in schools: "... we don't have any prepared schedules... I am not even certain if I can take pupils there."

Another purpose of asking the first question was to examine the current status



of technical support services provided to teachers. There was a common agreement among teachers (n=61) that the quality of technical service was sporadic. Teachers stressed that either there wasn't any IT coordinators or computer teachers at their schools or those who were appointed were incompetent. Some teachers criticized national and international vendors complaining that "They don't understand the nature of schooling... they leave computers and don't care if they are being used or not... they left us alone." Another interesting comment written by one teacher was "... why don't we leave management and maintenance of IT rooms to kids. Most are more knowledgeable than us. I am sure they would do a better job."

When asked about the Internet access, teachers reported that most schools had a dial-up connection that was relatively slow. Teachers added that they didn't want to waste their limited access to IT rooms with unpromising attempts at connecting to the Internet (n=19). For instance, one teacher wrote "... connection is always slow... it's just too frustrating for kids... it is being detrimental to their motivations. A number of teachers marked language barrier as another important obstacle to the use of Internet in schools (n = 20). Most useful sites for teachers on the Internet are predominantly English, and even though the number of sites with Turkish content has been increasing, it is not reaching the capacity yet to meet teachers' needs. For instance, one teacher commented that "... I see myself kind of lucky because I can handle those sites in English... I wonder what others are doing without knowing English." Another teacher wrote: "I saw a number of useful Internet sites that I can use in my class... most were interactive and I am sure my kids would love them... I don't understand why the Ministry doesn't develop similar stuff for us."

Similarly, a few teachers expressed their concern to become developers of such pages. One teacher's statement illustrated their willingness to provide students with better instructional materials: rather than teaching us 'what to do with technology', why don't they offer any training on how to do it... I don't think they know either."

It is obvious from these responses provided for the first question that nearly all teachers agreed on the scantiness of technical services at their school sites. The second issue raised by teachers was pertaining to the quality of Internet services in IT rooms. They believed a slow connection to the Internet failed to motivate pupils and foster their learning; rather it frustrated both pupils and teachers. Thus, they viewed those unpromising attempts at connecting to the Internet as a waste of time. Finally, teachers highlighted the need for availability of more Internet sites with Turkish content.

### **Quality and Effectiveness of Inservice IT Training**

The second question sought to discover if inservice training programs helped teachers improve their ICT skills. Not surprisingly, most respondents indicated that they didn't take IT related courses during their preservice training (n=55), but participated in inservice training programs. Even the number, content and duration of these programs varied noticeably. This is quite explicable, because



the Council of Higher Education, which is responsible for the development and supervision of preservice teacher curricula, didn't require teacher candidates to take any IT related courses to fulfill requirements for their teaching credentials until 1998. In line with the efforts to restructure teacher training programs, the Higher Education Council emendated every teacher candidate to complete two consecutive IT related courses, namely "Computer Application in Education" and "Instructional Technologies and Materials Preparation" in the 1998-99 academic year. Thus, most basic education school teachers completed their preservice training without taking any IT related courses.

Nearly all teachers (n=68) reported having participated in at least one inservice training program or seminar on the use of ICT in teaching. However, the teachers listed a number of issues regarding the effectiveness of inservice training and why it failed to contribute to their ICT skills. One of the issues reported by the teachers was that training programs were not tailored in accordance with their specific needs. The teachers complained that they all taught different grades or different subjects; and they were assigned to the same training programs disregarding their real needs. For example, one teacher reported that "... I was surprised when I met with other colleagues teaching different subjects in the class. I thought at the first place that we all needed the same skills and knowledge of ICT, but I discovered that was not the case by the end of the training." Another teacher commented: "It is not fair that they expect all teachers perform well on ICT use; how about our different backgrounds, interests, abilities and even age?" One teacher was even more expressive in her criticism "... I don't think ICT means the same thing to a math teacher than it does to a classroom teacher. I hope the Ministry realizes this and stops organizing useless training sessions for us."

Teachers also extensively criticized the training they received, underlying the fact that most training sessions failed to provide hands-on activities and practices (n=42). Teachers reported that most training sessions were in a seminar format and did not provide any opportunities for them to apply what they had learned. One teacher wrote "... it's a bit of a tragedy that those who train us think we will gain new skills by just listening to their presentations ... they [trainers] first need to learn how to train us [teachers]." Some teachers also underlined the need for timely training (n=12). One teacher said "when I first took training, the IT room was not yet established in my school... training must be timely and should parallel with the conditions we have at our schools." The following statement from one teacher is also an interesting one in terms of relating training activities to teacher's specific needs; "if you are a nonuser, you really don't know what to get out of the training... once you start using them [computers], you better understand your strengths and weaknesses."

A number of teachers (n=25) criticized the ministry for their centralized approach to the design and delivery of inservice training. Due to accommodation and logistical problems, teachers preferred receiving training in their provinces, and even at their schools. pertaining to localized training, one teacher wrote "IT coordinators or computer teachers should train us, because they know exactly

what we need... not university professors." On the other hand, another teacher criticized IT coordinators for not being competent enough to train teachers. He wrote "they [IT coordinators] are not well trained either. If they were all well trained, I am sure they would resign from their positions and start up their own business." Finally, teachers suggested that training should take place when schools were open, not during the summer break.

In summary, teachers' responses to the second question revealed that teachers did not think the inservice training they received prepared them for teaching with technology. They thought the Ministry should revise its centralized approach to training and start designing localized and timely training sessions based on the actual needs of a teacher.

### **Obstacles to the Effective Integration of ICT**

The third question was asked to discover obstacles that teachers believed prevented them from fully integrating ICT to their teaching. In their responses, teachers enumerated a variety of obstacles to the integration of ICT in schools. The most repeated obstacles reported by teachers are presented within the following themes:

**School Curriculum:** More than half of the respondents (n=45) reported that it was a really challenging task for them to find extra time for ICT in the curriculum. Teachers believed that since the current curriculum was heavily based around various subjects and in-class activities, it was already tough for them to cover all subjects of the curriculum during a school year. Their responses supported the position that the use of ICT in the class required more preparation time. One teacher commented "I think the biggest obstacle ahead of IT is the current curriculum. It's just too loaded with unnecessary and impractical information and skills." Another teacher added "I know ICT allows students to engage in more authentic and useful learning activities, but this is not what the current curriculum expects from students." The following statement from one teacher is quite interesting in terms of how some school inspectors underestimate the value of ICT in education; "...when the inspector is here, s/he is checking on our performance on how much of the content is covered in the class, and test scores of students, not the extent that ICT is being used." From the teachers' responses it is evident that the current curriculum stands as one of the major obstacles to the integration of ICT in schools.

**Lack of Incentives:** In the current system, there is a disincentive for teachers to engage in innovative classroom practices in that they are only paid for the number of hours that they teach, so any extra load is considered rightfully as an unpaid mandate. This issue was reported by a number of teachers (n=38). For example, one teacher wrote "...I understand why the Ministry cannot pay more for those [teachers] who use IT, but even a region-wide recognition would make a big difference." The same teacher further added that such recognition would encourage non-users to give it a try. Another teacher stressed the need for recognition of students who used ICT creatively in schools. He wrote, "Some students are doing marvelous things with computers. If we can share these with

other classes I am sure other students (and even teachers) would be inspired for a better use of ICT." It is obvious from the teachers' responses that teachers need recognition and encouragement for their timely and effective use of ICT.

**Lack of Pedagogical Support:** A considerable number of teachers (n=29) reported that technical support for ICT was not ample unless it was accompanied with pedagogical support. Teachers admitted in their responses that learning how to operate computers was just a beginning not the end. They added that they were left alone in their endeavor in using ICT. For example, one teacher stated that "I have a son attending high school ... he helps me a lot with computers ... but I need more than this... someone should show me how to teach with them [computers] and how to use software available in my school." Another teacher criticized IT coordinators for acting as technicians. She wrote "...they [IT coordinators] should do more than fix computers. They are trained as if they are technicians, but they should be more like technology leaders." Finally, teachers criticized inservice training programs for failing to demonstrate the new pedagogy of teaching with technology and ranked the lack of pedagogical support as one of the stern barriers.

**Lack of Clearly Stated Goals and Expectations from ICT:** In their written responses, teachers stressed that since the Ministry had not yet visibly announced and informed schools about what was expected from teachers with the provision of ICT, and what should be accomplished by using ICT, there was a great degree of confusion among teachers as well as school administrators regarding the role and function of ICT in schools. One teacher dramatized the current practices by writing that "...I wonder if the Ministry knows what to do with IT rooms, I think they expect us [teachers] to figure it out for them [the Ministry]." Another teacher reported "...it doesn't matter what you accomplish with ICT, unless what you should accomplish is clear." Remnants teachers blamed their school administrators for being unknowledgeable about the purpose for the provision of ICT in schools and for their reluctant leadership of technology.

**Lack of Collaboration among Teachers:** Finally, teachers reported that they were not able to share other teachers' experiences and the best practices of ICT use in their fields (n=34). Some even reported that they were not aware of what other teachers teaching the same subject were doing in their schools. A number of teachers reported that such collaboration would contribute significantly to their ICT practices. For instance, a teacher wrote "I would rather learn how to use those [computers] from a colleague teaching the same subject... I prefer someone who speaks the same language, not lots of technical jargon." Few teachers (n=9) noticed the role of being connected in their professional development. For instance, one teacher wrote "... schools with IT rooms should build their Web sites and share their best practices with others ... I am sure there is a lot to learn from each other." On the other hand, the same portion of the teachers added that with their current earnings (approximately 6,000 USD per year), they could not afford the cost of being connected, thus the Ministry should provide them with free (or low-cost) Internet access.

### Teachers' Suggestions to Overcome Barriers

As the last question in the follow up questionnaire, the teachers were asked to provide their suggestions regarding the barriers and obstacles that hindered effective technology integration in schools. The following list of suggestions are inferred and rephrased from teacher's written suggestions in the order of their frequency.

1. Timely and tailored inservice training (in accordance with teacher's actual needs) should be provided at the local level (n=68) and if possible, even at the schools themselves (n=44).
2. Timely and effective technical support should be provided for IT rooms (n=53).
3. The number of computers should be planned in such a way that a ratio of 2 pupils to 1 computer should be achieved in IT rooms (n=38).
4. An effective incentive mechanism should be available to motivate teachers towards the use of ICT (n=49).
5. School curricula should be redesigned in a way that it should provide enough time and space for the effective use of ICT (n=45).
6. Teachers should be provided with free or low-cost home computer and Internet access to improve their confidence and ICT skills (n=42).
7. Every attempt to introduce ICT in schools should be carried out with well defined goals, policies and roadmaps (n=37).
8. Rather than establishing IT rooms in all schools, schools that were more ready in terms of their infrastructure and personnel should be given the priority (n=34).
9. Instead of providing low-quality, mass inservice training to all teachers, high quality training should be given to more enthusiastic and self-motivated teachers (n=23).
10. Instead of the Ministry's centralized approach to the procurement of hardware and software, schools should have necessary resources and authority to procure ICT according to their needs (n=17).
11. Students should be more active in the maintenance and operation of IT rooms (n= 11).

### DISCUSSIONS

This study was conducted to examine the current utilization of IT rooms in basic education schools of Turkey. Furthermore, this study attempted to reveal the barriers and obstacles that teachers believed prevented them from the effective integration of ICT in schools. Finally, teachers' suggestions to overcome those obstacles were investigated.

The findings of this study indicated that teachers largely used ICT for creating handouts and tests, rather than using it to promote student's critical thinking skills and to foster their higher order cognitive abilities. Due to the lack of peda-

gological support, teachers reported the lowest frequency for the use of instructional software. Additionally, teachers felt most competent on word processing whereas they felt least competent on the use of instructional software.

The follow-up study revealed that inservice training was still a constant difficulty for many teachers to integrate technology in their classroom teaching. There is a large body of research in the literature that supports the same position that teachers should receive effective, timely and continuous training to promote technology in their teaching. (Wilson, Notar, & Yunker, 2003; Yildirim, 2000; Yildirim & Kiraz, 1999; Lemke, 1999; Northrup & Little, 1997).

Additionally, an appropriate access to technology is another key factor in the effective technology integration process (Norris et al, 2003). Teachers agreed that the use of ICT was only effective if every pupil in the class was assigned to authentic and meaningful instructional activities with sufficient number of computers. Otherwise, computer lab sessions would only waste a teacher's and student's precious instructional time; and further contribute to developing negative attitudes toward the use of ICT.

It can be palpably inferred from the teachers' responses that the current curricula do not cultivate the successful integration of ICT. Teachers reported that they either had enough time or contextual support to seamlessly embed ICT into the curriculum. This quarrel is also strengthened in the literature that curricula should be designed based on the principle that ICT should be used by teachers and students as an inevitable tool to expressively explore and construct their own meanings among the concepts of various subjects (Vrasidas & McIsaac, 2001; Knapp & Glenn, 1996; Ortega & Ortega, 1995).

Teachers expected strong and persuasive leadership from their administrators and leaders for ICT to diffuse smoothly through the system. In the related literature, school principals and leaders are largely criticized for their reluctant position to any kind of innovation penetrates into the system. Usually, their reluctance is coined with their insufficient training and their tendency to preserve the status quo. Dawson and Rakes (2003) stressed that "...without well-trained, technology-capable principles, the integration of technology into school curricula will remain incomplete." (p.46)

Finally, teachers underlined the inexistence of incentives that they thought disheartened their attempts to integrate the use of ICT in their classrooms. Needless to say, recognition and promotion of those who could make an evocative use of technology in teaching will not only ensure the continuity of such practices, but also encourage others to invent their own practices of using technology.

Based on the findings inferred from the present study, it is clear that the success of the Ministry's current endeavor to introduce ICT to basic education schools largely depends on teacher's collaboration and their active involvement to the process. In order to ensure such collaboration and involvement, the Ministry should develop and employ new policies to have teachers entailed in the decision making and planning processes. Unless the teachers are (1) empowered through appropriate preservice and inservice training, (2) led by a powerful leadership, (3) provided with necessary incentives, and (4) continually provided with

technical and pedagogical support, ICT will only add up more problematic issues to the existing ones; rather than catalyzing the current reform efforts of the Ministry to meet the demands of the information society.

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