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# In-service and pre-service primary school teachers' views and practices on ICT: a Greek case study

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**Abstract.** The focus of this study is the investigation of Greek primary school teacher*s' ICT-related practices and views. Two groups of pre and in-service teachers attending teacher-training courses at the University of Crete, Greece participated in a survey research (N=145). The analysis and discussion of results revealed that while they do have some ICT experience they do not believe that ICT will bring any innovative changes in teaching methods and practices. Such views seem to be shared among pre and in-service teachers who, as groups appear to differ regarding some of their own ICT-related practices and their views on the ways ICT should be introduced in primary schools. Discrepancies between teachers' views and the State's educational ICT policies were also identified and discussed. This study indicated the need for further teacher training that goes beyond the development of basic ICT literacy skills, putting emphasis on educational use of ICT and school-based programmes.

**Introduction.** While the educational use of information and communication technologies (ICT) have become a high priority among policy makers, educators, children and parents alike, the reality is that Greek primary schools still lack the resources to a discouraging degree. Characteristically, recent figures show that around 603.000 primary school pupils share around 4.200 PCs[1]. Nevertheless, it is important that the Greek State worked out a clear goal of equipping around 72% of primary schools with computers until the year 2006, dropping the percentage to 1 PC per 14 pupils[2]. Furthermore, a large-scale in-service teacher ICT training programme is under way[3]. It is also encouraging that there is already an educational framework (namely the 'Comprehensive Framework for Informatics Curricula') on the basis of which introduction and use of computers in primary schools can be based[4]. This framework sets, in a unified and centralised way, the aims, goals, and objectives for both primary and secondary education, adopting a mixed model where computers are both means and ends of the educational procedure. In this context teachers and pupils alike are assumed to undertake an active role in knowledge creation, assimilation and sharing.

Greek primary schools, being far behind from most of the rest of the EU states in terms of ICT introduction and use do face real challenges that are likely to affect many aspects of everyday teaching and learning. The current situation offers some unexpected advantages for schools, teachers and pupils. One of the most obvious is that primary schools will soon be equipped with the latest technology (given that the stated targets will be achieved). The least obvious, but of major importance, is that both policy-makers and practitioners may benefit greatly from other European countries' successes and failures developing policies and approaches that could support more flexible and educationally sound practices.

Both experience and scientific results during the last decade have shown that the mere availability of computers in schools is not enough for the development of sustainable and fruitful computer-mediated teaching and learning activities (see for example Simson *et al*, 1999; Komis, 1997; Schulz-Zander and Fankhδel, 1997; Veen, 1993). One of the most crucially under-estimated factor was the role that teachers could play in computer-mediated activities. The somewhat naive interpretation of prevailing constructivistic approaches to learning led to the assumption that ICT and computer-based learning environments, given their high interactivity, could provide by themselves the context for educationally sound pupils' experiences. Teachers were assumed to abandon their traditional role as 'transmitters of knowledge', undertaking a facilitating role in an environment where pupils using computers could become active learners. However, this could never be an easy task. As Veen (1995) argues, it should be realised that ICT use in education includes four simultaneous innovations: changes in pedagogy, content, teaching practice and organisational aspects of teaching. Nevertheless, it seems that little emphasis was given on how teachers could alter their life-long practices and widespread stereotypes

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[1] See http://www.infosociety.gr/infosoc/statistics/edu/docs/studentspc1.xls
[2] See http://www.infosociety.gr/infosoc/csf/1/docs/epktp.zip, pp. 3-73
[3] See http://www.pi-schools.gr/greek/announce/new-announce/gr_prokir114.htm
[4] See http://www.pi-schools.gr/greek/epps/but1.htm

on the role of teacher (Watson, 1993; Somekh, 1998). As Somekh (1998) suggests, teachers when faced with the 'task' to use ICT in their classrooms are very likely to feel a sense of loss of identity having to cope with perceived challenges and actual changes to their own work, the jargon-ridden ICT discourse, and the lack of ICT skills.

Growing research interest and efforts on these issues helped to the development of a deeper understanding of the role that in-service and pre-service teacher education could play in supporting (or discouraging) future and in-service teachers exploit the potentials of ICT in their classrooms. Murphy and Greenwood (1998, p.415), surveying research findings at international level arrive at the conclusion that ICT is significantly under-used by beginning teachers because of (among other reasons) lack of access to resources, lack of training and lack of encouragement to use ICT in initial teacher training institutions. Murphy and Greenwood's (o.p., pp.419-21) own research in three teacher training institutions in North Ireland showed that teacher trainers, although used computers more extensively than their students, did not feel they were as well trained in ICT as the students, and expressed lower confidence in their abilities to use computers in teaching. Recent research by Simson *et al* (1999, p.250) involving teacher trainers from all Scottish teacher training institutions revealed that only around half of them felt that they could follow future developments in ICT, while over 40% of them believed that ICT skills should be taught by specialised personnel. It is also characteristic that teacher trainers rarely used ICT to their teaching.

Teachers' age also seems to play a (rather unclear) role to their views and practices in the use of ICT. Barron and Bruillard's (1997, p.224) longitudinal study in a French teacher training institution (IUFM), showed that older students hold more positive views on the changes that ICT can bring to teaching than younger ones. According to Wishart (1997, p.276) age do play a role in pre-service teachers' attitudes on ICT but in opposite directions for males and females. Older women seem less 'scared' of using computers than older men. In contrast, Murphy and Greenwood's (1998, p.422) research found no significant effect of age on ICT use among pre-service teachers. Other research involving in-service teachers, contrary to expectation, have suggested that the most committed users of ICT are experienced and mature educators (see Schrum, 1995, p.223). Recent research in Greece, however, have shown that mature educators feel a high degree of anxiety when faced with the task of using computers than younger ones (Koustourakis *et al*, 2000).

Teachers' gender seems also to play an ambiguous role. Research have indicated that male pre-service teachers believe that they know more about ICT, express more positive attitudes, and have greater confidence on their abilities than the females (see Summers, 1990; Marshall, 1997; Watson, 1997). Other research findings have also suggested that pre-service female teachers are less involved with computers than males, and that men are more likely to use computers and a greater number of applications at work and at home (Wishart, 1997, p.279). In contrast, other research suggests that there are no gender-related differences regarding ICT (for a review see Murphy and Greenwood, 1998; Koustourakis *et al,* 2000).

This study focuses on the investigation of pre and in-service Greek primary school teachers' ICT-related practices and their views regarding the effects of the use of ICT to their teaching role and the teaching processes. The aim is to develop a deeper understanding on these issues and in particular whether there is any relationship between their status as pre or in-service teachers and their ICT practices and views. This is anticipated to offer further inputs regarding the development and implementation of ICT-related training programmes adapted to the specific needs of these two groups. Furthermore this study is aimed to investigate possible discrepancies between teachers' views on the use of ICT in teaching-learning activities and the State's ICT educational policies as described in the 'Comprehensive Framework for Informatics Curricula'.

**Research questions**

The specific research questions that this study addressed were the following:
a) What are primary pre and in-service teachers' ICT-related current practices?
c) what are the teachers' views regarding the ways that ICT may affect their teaching role in the classroom?
d) What are the teachers' views regarding the ways ICT may affect teaching processes?

**Methodology**

Sample and research tool. In total 145 teachers participated in the research. The teachers were belonging in two different groups: students-future teachers attending a BEd degree at the Department of Primary Teachers Education, University of Crete (n=84, 58% of the sample), and in-service teachers attending a training programme at the same institution (n=61, 42%). Among them 100 were females and 45 males. The mean age was 26,5 years (s.d.: 6,8 yrs, width: 27 yrs). Among in-service

teachers the mean work experience was 7,8 yrs (s.d.: 4,6 and widht: 19 yrs) The participants were asked to complete a questionnaire tested previously in a pilot study. The questionnaire was consisted of closed and open questions grouped in three parts designed to collect data on all three research questions. Descriptive statistics were used for the analysis of the data.

**Results and analysis**

Teachers' ICT-related practices. Data on teachers' ICT-related practices were obtained from questions regarding their ICT use, sources of information on ICT, and training. Characteristic results for both groups (in-service and students-teachers) and in total are summarised below together with the observed Chi-Square significance for the two samples (see Table 1).

| ICT practices | In-service teachers (n=61) | | Students-future teachers (n=84) | | Total (N=145) | | $X^2$ |
|---|---|---|---|---|---|---|---|
| | Freq. | Pct | Freq. | Pct | Freq. | Pct | Sign |
| **Own Pc** | 27 | 45,8% | 27 | 32,5% | 54 | 38% | ,109 |
| **Use of PC (yes)** | 41 | 67,2% | 69 | 82,1% | 110 | 75,9% | **,038** |
| **Internet** | 11 | 20,8% | 65 | 83,3% | 76 | 58% | **,000** |
| **E-mail** | 11 | 20,8% | 47 | 60,3% | 58 | 44,3% | **,000** |
| **Sources of Information** | | | | | | | |
| **Peer discussions** | 19 | 35,2% | 44 | 54,3% | 63 | 46,7% | **,029** |
| **Books** | 27 | 50% | 28 | 34,6% | 55 | 40,7% | ,074 |
| **Periodicals** | 25 | 46,3% | 27 | 33,3% | 52 | 38,5% | ,129 |
| **ICT-Training** | | | | | | | |
| **ICT courses (yes)** | 49 | 80,3% | 40 | 47,6% | 89 | 61,4% | **,000** |
| **Desktop Applications** | 18 | 36,7% | 19 | 47,5% | 37 | 41,6% | ,305 |
| **Educational Applic.** | 9 | 18,4% | 13 | 32,5% | 22 | 24,7% | ,124 |

Table 1: In-service teachers and student-teachers' ICT-related practices

It is interesting to point out that 38% of the teachers reported that they own a PC. This percentage is considerably higher from 15% that corresponds to the percentage of the general Greek population that owns a PC[5]. This suggests that teachers as a group may find computers as an important technology for professional and personal development, and computer ownership a necessary condition for achieving them. This is also evident by their responses regarding computer usage. Almost 76% of them report that they use computers (at home or work). Nevertheless, an important finding is that the two groups differ considerably in some of their ICT-related practices, namely the use of Internet and e-mail applications (p<,05). Only 21% of the in-service teachers reported that they use the Internet and e-mail compared to 58% and 44% of the student-teachers respectively. This is likely to result from wider social trends. The students, being in their 20's, are much more affected by the Internet culture and the new modes of communication and entertainment it brought to the life of younger people. Free Internet access that is provided by the university computer labs may be another reason. Students are more likely to spend more hours daily in the university campus than in-service teachers who attend to afternoon training courses, working at their schools during the morning hours. Such an explanation seems also relevant to their preferences regarding the resources of information on ICT. While students seek help from a knowledgeable peer (perhaps at informal meetings in the computer labs, the library or cafes), in-service teachers prefer to read ICT-related books and periodicals. Practising the use of computers in peer-groups may also be the reason why much less students (48%) report that they have attended to an ICT training programme than in-service teachers (80%). It also should be taken into account that during the last six years many secondary education schools in Greece have been equipped with computer labs and that the students in the sample are very likely to have had hands-on ICT experience through school activities. In contrast, in-service teachers having spent their secondary and tertiary education years in 'computer-free' classrooms are more likely to seek participation in formal computer-training programmes to gain in experience and confidence to their computer skills. The most commonly reported training is on desktop applications from both groups (42%), while only

[5] See *Measuring Information Society 2000*, A Eurobarometer survey carried out for the European Commission by INRA (Europe) – European Coordination Office in Spring 2000. Available at http://europa.eu.int/ISPO/basics/measuring/eurobaro/eurobaro53/docs/mis2000_report.doc (Last access: 11-5-2001).

a small minority reported that they have received some kind of training on educational applications. This is a key finding since it shows that their training remained on the level of the development of general ICT skills and that rarely went any deeper towards the use of ICT for educational purposes. Overall, the above findings suggest that the two groups differ in some important respects regarding their ICT-related practices although both seem to be ICT conscious. The lack of specific training on the educational use of ICT highlights the need for more and sustainable efforts by teacher-training institutions and individual teachers to relate ICT to their teaching and professional development.

**Teachers' views on how ICT may affect their role and teaching processes**

Descriptive data on teachers' views on the 'actual' role of teachers in the current Greek primary school system are seen below:

| What is the role of teachers in the current school system? | In-service teachers (n=61) | | Students-future teachers (n=84) | | Total (N=145) Missing: 3 | | $X^2$ |
|---|---|---|---|---|---|---|---|
| | Freq. | Pct | Freq. | Pct | Freq. | Pct | Sign |
| Knowledge transmitter | 24 | 40,7% | 37 | 44,6% | 61 | 43% | ,948 |
| Co-ordinator | 13 | 22% | 19 | 22,9% | 32 | 22,5% | |
| Collaborator | 14 | 23,7% | 17 | 20,5% | 31 | 21,8% | |
| Exploration facilitator | 8 | 13,6% | 10 | 12% | 18 | 12,7% | |

Table 2: In-service teachers and student-teachers' views on the current teacher's role

As it is evident from the data presented above, both pre and in-service teachers exhibit a high degree of agreement regarding the role of teachers in today's' schools. A high percentage of them (43%) believe that teachers are essentially 'knowledge transmitters'. A much lower percentage believes that teachers also act as co-ordinators or collaborators in teaching-learning activities (22%). The introduction of ICT in primary schools is believed that will change the current teacher's role by 52% of the teachers. However, it is worth pointing out that a percentage as high as 48% of them believe that ICT will not change the current teacher's role, in other words teachers will retain their predominant role as knowledge providers. Among those who believe ICT will actually help change the current teacher's role, almost half suggested that teachers will turn into co-ordinators (48%), and to a lesser degree collaborators (28%) or exploration facilitators (23%). Overall, both samples seem to agree for both, the current teacher's role(s) and the role(s) that teachers will undertake when ICT will be introduced in primary schools. It is also interesting to point out that the vast majority of the participants also believe that computers will not replace teachers in any respect (98%). This is because computers cannot replace communication that is afforded in teacher-pupils' interactions (39%), they are lifeless objects (26%), they are just tools (22%), or machines (13%).

The views of the two samples however differ with respect to the ways ICT should be introduced in primary schools. Firstly, contrary to pre-service teachers, the majority of in-service teachers reported that computers should be introduced from the first two primary grades (29 and 66% respectively, chi-sq. sign: ,000). Possibly this is because of differences in teaching experience among the two samples. In-service teachers are likely to feel much more confidence and therefore teaching computer literacy skills on top of regular language and numerical skills to young pupils is not believed to pose considerable challenges to their teaching skills. That in-service teachers feel more confidence to their skills is also apparent to their responses to the question of where computers should be placed. Many of them replied that computers should be placed in classrooms (41%), while only 21% of pre-service teachers gave this response (chi-sq. sign: ,038). This also may be an issue of power and routine. Maybe in-service teachers are less willing to leave their classrooms where they have the absolute control to a lab that is non familiar and not personally controlled. Pre-service teachers, on the other side prefer computers being introduced both in regular classrooms and school labs (50%), as they have not yet a strong sense of personal teaching authority or developed work routines. Pre-service teachers also prefer ICT being introduced both as an autonomous 'Informatics' course and as a medium for teaching other school courses (65%). In contrast, while 36% of the in-service teachers replied that ICT should *only* be introduced as a medium to teaching other courses, only a small minority of pre-service teachers prefers this option (13%, chi-sq. sign: ,007).

Overall, these differences in views may reflect more implicit issues regarding their identity as teachers. In-service teachers, having developed a clear professional identity, seem to have more confidence to their teaching skills, and therefore believe that computers should be introduced from the first primary

grades and in all courses; in parallel they seem less willing to loose some of their control that implies the use of a computer lab. On the other side, pre-service teachers are more ready to share control (which they don't have for the time being anyhow), but are less confident to their skills preferring computers being introduced in higher grades.

Despite these differences, as shown in the data presented below, pre and in-service teachers do not differ regarding their views on possible effects of the use of ICT to teaching. A description of the two samples' categorised responses to the open-ended question 'how you believe ICT may affect teaching' are shown below:

| How the use of ICT may affect teaching | In-service teachers (n=61) | | Students-future teachers (n=84) | | Total (N=145) Missing: 13 | | $X^2$ |
|---|---|---|---|---|---|---|---|
| | Freq. | Pct | Freq. | Pct | Freq. | Pct | Sign |
| **Stimulation of pupils' interest** | 14 | 25,5% | 25 | 32,5% | 39 | 29,5% | ,250 |
| **Support of teaching** | 12 | 21,8% | 17 | 22,1% | 29 | 22% | ,573 |
| **Individualisation of teaching** | 12 | 21,8% | 13 | 16,9% | 25 | 18,9% | ,826 |
| **Management** | 9 | 16,4% | 13 | 16,9% | 22 | 16,7% | ,566 |
| **Enhancement of teaching** | 10 | 18,2% | 12 | 15,6% | 22 | 16,7% | ,738 |
| **Non-specific positive judgement** | 8 | 14,5% | 9 | 11,7% | 17 | 12,9% | ,773 |
| **New teaching approaches** | 3 | 5,5% | 5 | 6,5% | 8 | 6,1% | ,556 |

Table 3: In-service teachers and student-teachers' views on how the use of ICT may affect teaching

Possibly the most striking result is that the vast majority of the participants did not consider that ICT might support the development or application of new or alternative teaching approaches (see last row on the table above). Additionally, a relatively small percentage of them (17%) suggested that ICT might enhance teaching and learning through the exploitation of its affordances for digital information access and communication. Most often teachers related the use of ICT to the stimulation of the pupils' interest (29,5%). Other responses defined ICT as a tool for supporting teaching (22%). In this category responses that suggested that such support is totally under teacher's control were included. The 'Management' category included references of the teachers to the use of ICT for more effective management of time and resources and better control of teaching objectives and outcomes (17%). The 'individualisation of teaching' category included responses related to the delivery of individualised teaching materials, support to individual pupils' learning needs and pace (19%). Overall, it appears that both pre and in-service teachers do not perceive ICT as a vehicle for dramatically changing traditional teaching, towards the development and application of new forms of teaching and learning. Instead, they view the use of ICT as a tool that may improve some aspects of the teaching process. It is also worth pointing out that the only references made on pupils getting more control over the teaching process by the use of ICT were related exclusively to individualised ICT-based learning.

In the more 'personal' open-ended question 'how would you use ICT in your school' we got the following categorised results:

| | In-service teachers (n=61) | | Students-future teachers (n=84) | | Total (N=145) Missing: 38 | | $X^2$ |
|---|---|---|---|---|---|---|---|
| | Freq. | Pct | Freq. | Pct | Freq. | Pct | Sign |
| **Educational Activities** | 39 | 83% | 53 | 81,5% | 92 | 82,1% | ,525 |
| **School Administration** | 6 | 12,8% | 9 | 13,8% | 15 | 13,4% | ,550 |
| **ICT Literacy** | 5 | 10,6% | 6 | 9,2% | 11 | 9,8% | ,718 |

Table 4: In-service teachers and student-teachers' views on how they would use ICT in their schools

The vast majority of the participants reported that they would use ICT for educational purposes (82,1%), while some of them answered that they will use computers to provide ICT literacy training to their pupils or for school administration purposes. In a more detailed categorisation of the kind of educational activities and processes that the teachers referred to we got the following results:

| | In-service teachers (n=61) | | Students-future teachers (n=84) | | Total (N=145) Missing: 38 | | $X^2$ |
|---|---|---|---|---|---|---|---|
| | Freq. | Pct | Freq. | Pct | Freq. | Pct | Sign |
| **Teaching-learning processes & outcomes** | 19 | 40,4% | 23 | 35,4% | 42 | 37,5% | ,771 |
| **Information access & communication** | 7 | 14,9% | 12 | 18,5% | 19 | 17% | ,408 |
| **Educational Tasks** | 6 | 12,8% | 9 | 13,8% | 15 | 13,4% | ,550 |
| **Drill & Practice** | 4 | 8,5% | 9 | 13,8% | 13 | 11,6% | ,288 |
| **Course teaching** | 7 | 14,9% | 5 | 7,7% | 12 | 10,7% | ,182 |
| **Development & presentation of materials** | 7 | 14,9% | 4 | 6,2% | 11 | 9,8% | ,113 |
| **Educational Software** | 2 | 4,3% | 9 | 13,8% | 11 | 9,8% | ,084 |
| **Discovery & exploration** | 4 | 8,5% | 6 | 9,2% | 10 | 8,9% | ,586 |
| **Desktop Applications** | 2 | 4,3% | 6 | 9,2% | 8 | 7,1% | ,267 |

Table 5: Categories of ICT-related educational activities

It was difficult to develop some clear-cut categories on the educational activities or processes that the teachers reported that would use ICT for in their school. This was because their answers implied different levels of abstraction. For example, while many of them reported that they would use ICT to support communication through the Internet, others referred to learning processes, or course teaching. The most often responses referred to the support or improvement of teaching-learning processes or outcomes, such as 'deeper understanding' or 'development of critical skills' (37,5%). Nevertheless, in most of the cases there were no hints as to how the use of ICT would contribute to them. It is also characteristic that only a small minority of the teachers referred specifically to the use of educational software, (such as educational CD titles or educational games), and general-purpose applications (such as word processors, spreadsheets or presentation software). The higher percentages of specifically referred to software were on web browsers and e-mail for information access and communication purposes (17%), and drill and practice software (12%). The use of ICT for discovery and exploratory learning was mentioned by a mere 9% of the teachers, a result that supports our earlier analysis of Table 3 data, namely that the teachers do not consider that the use of ICT helps to the development and application of new forms of teaching and learning.

**Discussion**

Given the governmental plans for widespread introduction of ICT in primary schools it is very encouraging that a high percentage of pre and in-service teachers reported that already owns (38%), or uses computer (76%). This may lift a considerable burden for large-scale basic computer literacy training that would, in consequence, lead to delays in regular use of ICT for everyday school activities. As it is however evident from the kind of ICT training teachers report they have received, many efforts should be put on the development and implementation of training programmes that would put emphasis on the educational use of ICT. The lack of such training is also reflected on their responses regarding teachers' intended use of ICT in their schools. Their responses tended to be rather vague (for example, 'I will use ICT to teach Geography', '... develop learning skills', or '...use word-processing'), mentioning rarely how and on what terms they are intending to use ICT to achieve their goals. It is characteristic that only few mentioned the use of educational software or the development of exploratory activities. Overall, pre and in-service teachers seem not to differ in most of the issues investigated in this study apart from some of their ICT practices and the ways they believe ICT should be introduced in primary schools. As it was suggested this may be due to age and work experience.

The introduction of ICT is believed to lead to changes in the traditional role of teachers from 'knowledge transmitters' to 'co-ordinators' of the teaching-learning process. However, ICT is viewed mostly as a new medium that will support or enhance some aspects of existing teaching-learning practices, rather than lead to the development of new and innovative ones. It is also characteristic that pupils' active participation was mainly related to the individualisation of teaching (19%), while only a mere 9% of the teachers reported that will use ICT for discovery and exploratory activities. The above are in contrast with what the 'Comprehensive Framework for Informatics Curricula' is expecting ICT to be used for in primary schools. Characteristically, in this policy document it is clearly stated that

ICT introduction should lead to restructuring of everyday school life through the development of new activities that cross boundaries among traditional courses, while pupils should assume an active role in the educational process, and engage in creative activities based on collaboration[6]. Such discrepancies may be due to differences in perspective. While teachers, perhaps because of their position in the educational system, are more pragmatic and sceptical on the possible changes that ICT will bring into their current or future work environment and practices, the State because of its 'higher' position in terms of policy making and educational ideology shaping is much more apt to set optimistic goals and standards. Overall, it is suggested that pre and in-service teacher training institutions should undertake more actively the role of bridging some of these gaps between policy and practice by providing ICT training that goes beyond the development of basic ICT literacy skills to educationally oriented and preferably school-based training on ICT. This is a real challenge for teacher-training institutions in Greece because it may demand extensive educational ICT training and use from teacher-trainers, reform of teacher-training curricula, and the development of closer relationships with primary schools.

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[6] See http://www.pi-schools.gr/greek/epps/but1.htm, ch.3.b.