

Attitudes of schoolteachers towards the Information and Communication Technologies

Tsolakidis C., Fokides M.

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Abstract:

Starting from the year 2001 and for the following five years, in the frame of introducing Information and Communication Technologies (ICT) in Greece's Primary and Secondary Education, actions are undertaken into two major sectors. Providing all schools with computers and training all educators in ICT. The success of such an effort depends largely in the beliefs and attitudes that teachers have towards ICT and its applications. For these reasons, during the course of their training programme, a questionnaire was issued to a number of participants and its findings are presented in the present paper. The research realised the rapidly increasing penetration of ICT in primary schools. It also recorded the ways that teachers use the computers, the methodology that they propose for the introduction of ICT in the school's timetable and the need for systematic and continuous training in ICT. It also reveals technical and organisational problems associated with the above training scheme.

1 Introduction

Information and Communication Technologies (ICT) affect and reshape almost every social and economic activity. With the aim of promoting ICT in a coherent and integrated manner, the Operational Program for the Information Society (OPIS) was initiated in 2001. This is an innovative horizontal program, across government's departments, which aims to implement the essential features of 1999's White Paper of the Greek government entitled "Greece in the Information Society". In order to take full advantage of ICT benefits, citizens need to acquire new skills, thus the need for continuing learning and revision of the education system emerged. The central authorities realized this need and a significant part of OPIS is devoted to education.

As far as Primary and Secondary Education are concerned, OPIS is the first -and only- large scale program for the application of ICT in this level of education and sets the following targets [1]:

- Equipping all schools with the necessary computers, network and audio-visual equipment.
- Training all teachers and high-school professors in the use of Internet and multimedia resources as an educational tool.
- Completing and upgrading the Greek School Network, thus establishing access to the Internet and multimedia resources for all Greek schools by the end of 2001 and providing a complete Intranet for the education system by the year 2006.
- Developing infrastructure for tele-education for teachers and students throughout the country.
- Supporting the development and dissemination of tutorial multimedia material and promoting the certification of scholarly software applications.

It is easily understood that the difficulties in implementing such a program are great. In particular, the large number of schools and teachers makes the accomplishment of the first two targets a really hard task. It is worth examining in more detail why:

As for equipping schools, in Secondary Education things seem relatively simple. This is because 80% of high schools already have computer labs and are connected to the Internet. However the goal is to equip 100% of schools while the technological obsolescence of the existing labs is a problem. The main problem resides though in Primary Education where only 36% (i.e 2100 out of 5.800 primary schools) are provided with computer labs and are connected to the Internet [2]. One should take into account that, apart from the official computer labs, a number of primary schools is equipped with machines and connected to the Internet, relying for funding on parent's societies, local authorities, donors and sponsors. Even if these are counted, however, primary education still lags behind the desired ICT level. The goal of OPIS by the year 2006 is to organise computer labs in 72% of primary schools, to provide connection to the Internet for all of them and to reach the number of computers per students at a proportion of 1/12.

For the accomplishment of the teachers' training target, roughly 100,000 teachers (of primary and secondary level of education) need to be trained in ICT's uses and applications. Each course, though

small in duration, needs to be prolonged in time for a series of reasons, among which the most important are three: (a) due to the large number of participants, many groups are created, each with a maximum of 15 people; (b) lessons should be taking place during teachers' spare time, (c) there must be a time interval between each lesson allowing new knowledge to be acquired. Participation and attendance are obligatory; there is a small compensation for the trainees that has to be spent in buying a computer and/or related accessories.

The first cycle started in October of 2002 and will continue throughout the first quarter of 2004. It is an introductory cycle and schoolteachers during which teachers acquire the basic skills in using a computer, office applications, the Internet and the e-mail, attending ECDL-type lessons. Its duration is 48 hours, divided in two weekly sessions of 3-hour each.

The success of such an effort depends largely on the participants' understanding of the program's necessity and on their positive stance towards it, which to a great extent reflects the beliefs and attitudes that teachers have towards ICT [3], [4]. It is worth examining these attitudes, the factors that determine them as well as the expectations that teachers have from an ICT training course in general and specifically from the undergoing ICT training course. For this purpose a questionnaire was issued and distributed to a random sample of participant teachers in training centres in Athens and in Rhodes.

2 The questionnaire's structure, targets and data

The questionnaire was given after the completion of the course, so that trainees (even if novices at the beginning of the course) had the chance to form their own opinion. It consisted mainly of closed questions to facilitate easy and quick analysis. There were five groups of questions regarding the following issues:

- (i) general data such as age, sex, years in service, type of school,
- (ii) previous knowledge in ICT and computer applications,
- (iii) use of computer infrastructure in school, (purpose, frequency of use etc) and at home
- (iv) perceptions about ICT in school's curriculum and
- (v) comments on the training course itself.

Through these groups of questions the following targets were set:

- To explore the opinions and attitudes of educators regarding the use of ICT in school's environment. It is obvious that knowing how to use a computer does not necessarily mean that one will use it during his/her work. Knowing the attitudes, however, is an indicator of potential future use.
- To determine if these beliefs keep pace with the attitudes they have for ICT and technology in general in their private lives.
- To determine if all the above are influenced by factors such as age, sex, years in service, knowledge of a foreign language, etc.

One of the main issues in training large numbers of people is that the content, the timetable and the structure of the program must meet the interests and needs of different groups of trainees [5], [6]. For that matter, the "feeling" that teachers have about the training process needs to be resolved. Moreover, the identification of the program's strengths and weaknesses gives a feedback that helps determining what can be changed in favour of the program's efficiency and effectiveness.

3 The results

The results are presented in five tables following the above grouping of questions.

The participants' profile is presented in Table 1. In total, 317 educators participated, from Athens and Dodecanese training centres. Their age groups and years in service represent the typical age distribution of teachers in Greece with the exception of the upper age group (56-65), which is under-represented. Educators of this age generally do not attend any kind of training courses since they are near retirement. With few exceptions the participants were employed, appointment on a permanent tenure basis. The teachers reported specialisation in various subjects and different educational levels. Most of them were primary schoolteachers, mathematicians, language teachers and kindergarten teachers. Their knowledge of English as a foreign language was reported average.

Table 1. General data. The participants' profile

| | |
|---------|-----|
| Males | 141 |
| Females | 160 |
| N/A | 16 |

| | |
|-----------|-------|
| Age 25-35 | 18.9% |
| Age 36-45 | 40.0% |
| Age 46-55 | 22.7% |
| Age 56-65 | 2.8% |
| Age N/A | 15.6% |

| | |
|--------------------------|-----|
| In Kindergarten | 23 |
| In Primary school | 143 |
| In Junior High school | 56 |
| In High school | 49 |
| In Technical High school | 27 |
| Other | 10 |

| | |
|--------------------|-----|
| Nursery teachers | 23 |
| Schoolteachers | 116 |
| Mathematicians | 30 |
| Language teachers | 23 |
| English teachers | 11 |
| French teachers | 5 |
| Physics teachers | 12 |
| Theology teachers | 8 |
| Physical Education | 12 |

| | |
|------------------------|--------|
| 1-5 years in service | 19.3% |
| 6-10 years in service | 20.25% |
| 11-20 years in service | 31.7% |
| >20 years in service | 28.75% |

| | |
|-------------------|-------|
| English very good | 18.6% |
| English average | 64.4% |
| English poor | 17% |

Table 2 presents the teachers' level of knowledge on ICT and computer use before the course. According to their own judgement, only 9% was very familiar with computers. Most of them were beginners or had mediocre knowledge. Referring to the different ICT uses, almost one third of them could use easily office applications, Internet browsing programs and games. The trainees used the Internet mainly for information retrieval. Most of the teachers reported that their knowledge and skills originated from seminars and studies though a substantial percentage was self-trained or received help from friends. Half of them were being kept up to date for ICT matters rarely and one third of them often. The main source for keeping up to date was help from friends and seminars.

Table 2. Basic skills before the training courses

| | | | | | |
|----------------------|-------|--------------------------------|-------|----------------------------|-------|
| ICT skills very good | 9% | Use of office suit | 39.5% | Skills from seminars | 43.4% |
| ICT skills average | 43% | Use of Internet | 34% | Skills from studies | 15.2% |
| ICT skills novice | 48% | Use of games | 18.5% | Skills from friends | 28.8% |
| | | Use of other progr. | 8% | Skills alone | 12.5% |
| Briefing very often | 6.5% | Briefing from printed material | 33.4% | Internet for information | 67.6% |
| Briefing often | 34.8% | Briefing from TV | 8% | Internet for communication | 24.8% |
| Briefing rarely | 54.5% | Briefing from friends | 23.3% | Internet for games | 7.5% |
| Briefing never | 4.1% | Briefing from seminars | 34.5% | | |

Table 3 shows the use of computer infrastructure at school. It is worth noticing that (with the exception of 44 educators) the participants had the chance to use a computer at school, though only 22.7% used it on a regular and frequent basis. The trainees stated that they were satisfied from the computer's quality (72%) and availability (50%). At school, besides teaching Information Technology, the most common ICT uses concerned administrative rather than educational issues. In the trainees' private lives things seemed to be the same: 69% of them had computers at home and 35% used them frequently. The only significant difference is that at home they used computers either for preparing the next day's lessons or for recreation.

Table 3. Computer usage at school and at home

| | | | | | | | |
|------------------------------|------|-------------------------|------|----------------------------|------|-----------------------|------|
| Frequency of use at school % | | Type of use at School % | | Frequency of use at home % | | Type of use at home % | |
| Very often | 22.7 | Administration | 35.6 | Very often | 36 | Lessons preparation | 47.2 |
| 2-3/week | 17.2 | Teaching Info. | 35.7 | 2-3/week | 34 | Educational Progr. | 24.2 |
| 1/week | 12.3 | Educational Progr. | 7.7 | 1/week | 12.8 | Games | 16.8 |
| Rarely | 40 | Internet-mail | 9 | Rarely | 14.7 | Nothing | 11.8 |
| Never | 7.8 | Games | 12 | Never | 2.7 | | |

Table 4 describes the participants' attitudes towards ICT. It may be observed that the participants were strongly in favour of the introduction of Informatics in primary school (86.4%) as well as of teaching lessons supported by computers (97.3%). One third of them think that all lessons can be taught with the aid of computers. Interestingly enough, while they think that computers make teaching easier (99.1%) and do not create problems to students, their view is that computers create problems to teachers (51%).

The participants recognize the need for new knowledge acquisition (94.3%) and continuous training (85.8%), while they consider that the past training they had was insufficient (64.35%). Almost half of them (45%) had some kind of stress when using a computer and 29% were afraid that they might cause some damage. They had trouble in understanding technical matters (60%), the technical terminology was difficult to comprehend for 21% and the use of English in the operating system and in applications is a problem for another 50.8%.

If the teachers were given a year in order to be prepared to teach Informatics at primary school, 15.8% would not be able to carry out the task, 28.3% would be able with great difficulties, 20.7% would be able with some prerequisites (i.e. training, computer labs, training material) and 35.18% stated that they can easily respond to the needs of such a task.

Finally, in order to determine how important they consider ICT, a scenario of spending 7,000€ (enough for equipping a small computers lab) for the needs of the school was given. They were asked to where they would spend that money in a way that they would indicate their priorities and ICT was their first priority in only 23.1% of their answers.

Table 4. Attitudes towards ICT and computers

| Computers in school % | | Lessons with computers % | | Teach Informatics in a year % | |
|-----------------------------|-------|--------------------------|------|-------------------------------|-------|
| Make teaching easier | 99.1 | Theoretical | 13.2 | No | 15.8 |
| Create new needs | 100 | Science | 15.6 | Yes with difficulty | 28.3 |
| Create problems to students | 16.13 | Foreign language | 14.8 | Yes with prerequisites | 20.7 |
| Create problems to teachers | 50.1 | Informatics | 22.7 | Yes unconditionally | 35.18 |
| | | All | 33.7 | | |

| | Yes | No | | Yes | No |
|---|-------|-------|----------------------------|-------|-------|
| Teachers must know ICT | 94.32 | 5.68 | Continuous training needed | 85.8 | 14.2 |
| No trouble understand technical matters | 40 | 60 | Many English terms | 50.8 | 49.2 |
| Technical terminology is difficult | 21.13 | 78.87 | Training insufficient | 64.35 | 35.65 |
| Afraid of damaging the computer | 29 | 71 | No stress with computers | 54.9 | 45.1 |

| Priority | Make repairs % | Hire Staff % | Buy educ. material % | School library % | ICT % |
|----------|----------------|--------------|----------------------|------------------|-------|
| 1 | 47.18 | 10.75 | 12.76 | 14 | 23.1 |
| 2 | 10.56 | 14.7 | 26.6 | 17.5 | 30 |
| 3 | 10.56 | 16.84 | 26.6 | 23.9 | 21.4 |
| 4 | 12.32 | 17.92 | 25.89 | 26 | 14.5 |
| 5 | 19.37 | 39.78 | 8.15 | 18.6 | 11 |

| ACTIONS | Weighted priorities (A*5, B*4, C*3 etc) | | | | | preference |
|----------------------|---|----|----|----|-----|------------|
| | A | B | C | D | E | |
| Repairs to School | 134 | 30 | 30 | 35 | 55 | 1005 |
| Hire Staff | 30 | 41 | 47 | 50 | 111 | 666 |
| Educational material | 36 | 75 | 75 | 73 | 23 | 874 |
| School Library | 40 | 50 | 68 | 74 | 53 | 805 |
| ICT | 67 | 87 | 62 | 42 | 32 | 985 |

Table 5 reports the results from the impression that the courses created to educators. In general, around 60% regarded that the selection of course content and the duration of the course were good, though there were some objections, about the course structure, content and procedures. In general the trainees considered that the response of their group to the course content was average.

Table 5. Comments on the Course

| Duration of the course % | | Selection of the content % | | Group level % | |
|--------------------------|------|----------------------------|------|---------------|------|
| More than enough | 1 | Very good | 34.9 | Very good | 17.5 |
| Satisfactory | 24.3 | Good | 62.1 | Average | 59.5 |
| Enough | 57.2 | Poor | 3 | Below average | 23 |
| Less than needed | 17.5 | | | | |

| Briefing satisfaction % | | Enrolment procedure satisfaction % | | Problem with absences % | |
|-------------------------|------|------------------------------------|------|-------------------------|------|
| Yes | 82.3 | Yes | 89.2 | Yes | 36.5 |
| No | 17.7 | No | 10.8 | No | 63.5 |

4 Discussion of the results and conclusions

The results reported above provide an interesting material for discussing the issue of teacher's attitudes about ICT at school and ICT training, in the light of the existing preconceived expectations. Based on the above structure, the discussion for analytical purposes follows three unities, the first concerning the teachers profile, previous knowledge and usage of computers, the second their attitudes for ICT in general and the third their attitudes for the specific course.

A. With respect to the teachers profile in relation to ICT, the most important points are reported below:

- As already pointed out, half of the trainees were new computer users. This was expected for teachers with a long time in service, since middle-aged people usually have difficulty or do not find it necessary to get acquainted with technology. It was also expected for primary and kindergarten teachers considering that, in contrast to what happens in other grades of education, ICT is still not introduced in Greek primary schools and kindergartens, Teachers with long time in service followed the expected rule of low ICT familiarisation. However this was not so for primary and kindergarten teachers: A (nice) surprise was the relatively high rate of primary and kindergarten teachers that were proved familiar with computers. In fact a little less than 50% of them reported to be average users of computers.
- The results have shown that the level of familiarisation with ICT is not gender dependent. An attempt to correlate gender and computer knowledge gave insignificant outcomes. A correlation coefficient of 0.12 between a dummy variable for gender (women =0 and men=1) and a dummy for computer knowledge does not allow any conclusion on this issue. There seems to be a weak positive relationship between the degree of expertise in ICT and the availability of a computer at home (with a relevant correlation coefficient 0.35) and a stronger (yet still below 0.50) between such an expertise and the frequency of computer usage at home or at school (with a correlation coefficient 0.45 in both cases).
- An interesting observation is that almost all trainees that reported to be good users stated that they have learnt computers usage alone and they are very frequently briefed in the developments in technology and computers. Though the vast majority of the trainees already attended seminars and other types of studies and continuing training, experience gained by personal practice seems to be a very important factor [7], [8].

B. The results concerning the teachers' general attitudes about ICT at school are highly revealing:

- The general feeling is that teachers have in their majority a positive stance about the introduction of ICT at school. They consider that computers will help the educational processes in various ways. It is encouraging that a significant percentage finds that ICT will help the teaching/learning process of all subjects. Equally important is that a high rate of teachers believes that theoretical subjects and foreign languages can also be helped by the use of computers, thus breaking, up to an extent, the myth that wants computers, which are tools of hard sciences, to be useful only in "hard" modules, like science and maths.

- The positive general attitude of teachers with respect to ICT is cross concluded by the result according to which teachers consider ICT as the second urgent need in schools after the need for repairs in the buildings. The fact that the need for ICT is more intensive than the need for hiring staff, buying educational material and organising the school library, indicates that teachers have a strong positive feeling about the importance of ICT and the computers' capacity to improve school conditions and educational quality. It is interesting to examine this, in connection to traditional indices of educational quality (such as the number of pupils per teacher).
- The fact that more than 1/3 of the teachers unconditionally are prepared to teach with a computer, shows that the barriers of computer illiteracy is practically and psychologically broken by a considerable number of educators. If one adds to the above rate the number of teachers that can teach using ICT, provided that some conditions are met, the general conclusion is that the education's human capital is to a great extent prepared for the introduction of computers at school. The rather small percentage (15.6%) of those who cannot teach using ICT at all was not unexpected and most likely refers to teachers that (a) have a strong belief in favour of the conventional approach, (b) suffer from strong techno-phobia, or (c) simply have difficulty in developing computer skills adequate to make them overcome computer illiteracy.
- Within the same context the well-balanced distribution of the answers concerning readiness to teach shows that there are significant differences among teachers in the level of computer literacy. This should be taken into account by training course organisers, since it could be a waste of time and resources to offer the same training course to all teachers. A differentiation according to the levels of literacy could lead to more successful results. This does not necessarily mean that teachers already familiar with ICT should be excluded from training courses. On the contrary: the organisation of advanced courses for these teachers could help not only these trainees to develop further skills but also to act as mediators that will help spread computer knowledge in the schools where they will work in the future.
- In spite of the fact that computer illiteracy among teachers is limited, teachers believe that the training provided officially in this field is not sufficient. This result shows that teacher's perception is that the institution that employs them (the Ministry of Education, in the case under examination) should not be replaced by unofficial institutions/friends etc in providing the required knowledge. Related to this result is the one concerning the source where from the teachers got knowledge on computers: it is interesting to notice that a very small percentage of teachers has learnt computers during their studies. This is worth analysing further: it could possibly lead to the conclusion that the university departments from which teachers graduate should be enriched with more modules in Information Technology and better ICT infrastructure.
- In addition to the implied need for ICT in university departments of education, teachers believe strongly in the need for continuous training. This should be examined in connection with the fact that technology changes rapidly creating often the need for renewing and supplementing the relevant knowledge. Moreover it shows that teachers are well aware of the necessity of lifelong training, seek opportunities for personal development and understand that training is necessary if they want to be competitive in their job. Given the fact that most teachers in Greece work under conditions of tenure, hence they have not the risk of losing their job easily, this competitiveness already mentioned mostly refers to prospects for promotion, chances to work in schools of their preference and higher respect from colleagues, pupils and the society in general.
- In spite of what has already being stated about ICT familiarity, there is still some techno phobia among participants. It seems that the teachers although prepared to meet technical problems, they find that technical terminology is difficult. The fact that the majority of teachers have average knowledge of the English language, in connection with the fact that terminology is mostly in English (or in translation from English), could be adequate reasons for explaining why such difficulties and phobias emerge. It is suggested that the problem can be solved by (a) producing good quality; easily readable manuals in Greek (b) developing simple "help" sites in Greek (c) establish support teams or networks that could answer the teachers' questions. With respect to the development of support teams, the University of the Aegean has an already long experience from providing support to teachers of small islands during the implementation of the programme SHEDIA with very good results [9].

C. With respect to the trainees attitudes for the specific training program the main conclusions drawn are as follows:

- The trainees have pointed out the need for practice in order to become familiar in the use of computers. This seems to be the major reason of stress and anxiety with respect to the course. This feeling is evident in particular for novices who had strong views regarding the quantity of the content in respect to the duration of the course and the time interval between each lesson. Overall, they declared that they had no time to put in practice what they have learned in each lesson.
- Although the length and the duration of the course were parameters that had been taken into account at an organisational level, many non-novice teachers have considered that the seminars have covered a great deal of material in a short time, not leaving enough space to them either to absorb the newly taught material or to practice. The differentiation of the courses according to the teachers' ICT knowledge could probably solve this problem. Other proposals, such as the repetition of the seminar during the summer or the constant operation of a training programme, which would give to the teachers the chance to attend in the period that suits them, seem interesting and worth considering. The latter seems to be consistent with the idea of a permanent institution of in-service teachers' training, which will be expected to cover training needs not only in computers but also in other fields [10]. Equally interesting is the proposal for distance training which not only allows teachers to be trained in a flexible way but is also cost effective at least in the long run.
- The view that educational material should be well organised and available before the beginning of the training course is worth implementing. Teachers that attend have a lot of other responsibilities and having the material early helps them to be better prepared, being also a gesture of respect in the time and effort they undertake. Equally important is to have the educational material in hard copies; one should always bear in mind that the generations that educational material especially designed for the training purposes seems to be a "must" for the efficiency of a compact course as the one under implementation.
- Finally it is worth mentioning the need for reconsidering and improving the organisational and administrative part of the program, so as to meet the training needs in a more efficient and effective way.

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Authors:

Costas Tsolakidis, Assistant Professor
University of the Aegean,
Department of Education
Address: Dimokratias 1, Rhodes 85100, Greece
Email: tsolak@aegean.gr

Manos Fokides, Researcher
University of the Aegean,
Department of Education
Address: Dimokratias 1, Rhodes 85100, Greece
Email: fokides@aegean.gr

