Primary School Pupils' ICT Literacy in Northern Aegean

Giavrimis Panagiotis

Department of Sociology
University of the Aegean, Greece, Pamfilis 17, 81100 Mytilene, Greece
Corresponding author: *Tel: 030-22510 36554 Email: giavrimis@soc.aegean.gr*

Ekaterini Nikolarea

Department of Geography
University of the Aegean, Greece, University Hill, 81100 Mytilene, Greece
Tel: 030-22510 36438 Email: anikolarea@geo.aegean.gr

Doi: 10.5901/mjss.2012.03.01.21

Abstract The present research is part of the outcomes of a wider research that explores the ICT [Information Communication Technology] applications to Greek Public Primary Schools and their impact on teaching, learning and cognitive processes as well as on pupils' behavioural adaptation, according to Primary Education Teachers' opinions and the Pupils of the 5th and 6th Grades of Greek Public Regular and Day-long Primary School (DLPS). The research sample consisted of 316 pupils, of the 5th and 6th Grades of (Public) Primary Schools in Northern Aegean. Of the pupils, 153 (48.4%) were boys and 163 (51.6%) were girls. In the outcomes, it is discussed about pupils' opinions on the degree of their acquisition of basic ICT skills, as mentioned in the Greek Primary School Curriculum.

Keywords: ICT, Day-long School, ICT literacy.

1. Introduction

In a globalised society, ICT plays a dominant role and influences both the developed and the developing countries alike, something that is conspicuous from the UN (United Nations) data (P.N.U.D., 2001) and from the data referring to the exports of high technology products of these countries (World Bank, 2009). In the work place, not only in the IT [Information Technology] sector but also in all other sectors, we see emerging new scientific and technological specialities that require knowledge of New Technologies.

Rapid technological and scientific developments, especially in ICT, and their repercussions in all scientific and economic sectors require and will require not only the activation of a person's cognitive and creative powers in the future but also of all his/her psycho-social skills of dynamic survival, so that the person will be able to function in more complex, advanced (both from symbolic and practical view), open, altered and unpredictable environments.

The above-mentioned situations generate new data in education and force the traditional school to change its role so it may respond to people's new needs and the new demands of the post-modern society. Research data reveal that a person should acquire both symbolic languages and the knowledge of how to interpret formed data and make critical analysis of digital information (Giavrimis et al., 2009). In our post-modern society, both the models of educational and learning behaviours and those of organisation of production and work should be changed. The way of how knowledge itself is constructed should to be changed; it should get away from formalism and be directed to the active cognitive participation of subjects themselves through their interaction with their social environment (as Piaget and Papert claim), taking into consideration the multicultural and biographical culture of school units (Kapsalis, 2006).

Eventually, pupils' contact with ICT should also ensure that the pupils acquire the desired digital literacy in addition to traditional literacies (i.e. linguistic and numerical). The development of digital literacy is defined

as: "The ability to use information and communication technology (ICT) proficiently", and as "Technology which provides for the electronic input, storage, retrieval, processing, transmission and dissemination of information" (Tissot, 2004: 58 and 78 respectively). Should we expand the preceding definitions, we could add that we should consider a person's attitudes toward ICT, as to whether s/he uses it effectively and without phobic hang-ups. Nowadays, digital "literacy" - that is, the acquisition of skills in searching, assessing, organising and using (digital) information - determines decisively the future of a society like ours, and the course of pupils' learning and development; it also determines pupils' background of learning, cognitive, mental and social development and mobility as well as their advanced discursive ability.

Research data show that ICT can enhance pupils' performance in school subjects. Thus, research data illustrate an increase in pupils' (school) performance and motivation while using ICT in language classes, physics and technologies (Cox et al., 2003; Ofsted, 2004; Rumpagaporn & Darmawan, 2007). Although there are several major findings supporting the benefits that ICT integration offers to schools, researches raise questions about the extent and depth of changes that occur (Kozma, 2003) and the integration of ICT in education (Komis, 2006). Schools investing in ICT achieve much better outcomes than their counterparts with insufficient digital background and technical infrastructure (Ramboll Management, 2006). It should be noted however the use of ICT in the educational system is effective when the educational personnel is flexible and experienced (Machin et al., 2007).

Moreover, the increasing technological advancement and the use of its various forms (DfES, 2003; Kozma, 2008), the increasing demand for young people's education and training in ICT and the Declaration in Lisbon Summit (Ioakimidis, 2008) – whose objective was that Europe should be "competitive and mobilised by knowledge" – the strategic orientation towards an "Information Society" have become more intense, revealing the importance of acquisition and use of digital skills in and through the educational system. However, this necessity of (digital) literacy, according to Papert (1996), is also a point of criticism, as it can create conditions of social exclusion either directly or indirectly for low socio-economic classes.

2. The Greek Context

2.1 Introduction of ICT to the Greek Public Regular Primary Schools

IT teaching in Greek public regular primary schools began in 1985 in a rather fragmentary way. Those efforts were based on some pilot projects implemented in some secondary schools (or Gymnasiums or Junior High schools) (Michailidis, 1989). In 2002, the Pedagogical Institute (PI) organised the Inter-thematic Integrated Framework of Study Programmes (DEPPS in Greek), introducing an inter-thematic approach to knowledge. That innovative effort re-adjusted teaching objectives and methods, structuring at the same time the content of the taught self-contained subjects, since it was based on a balanced horizontal and vertical distribution of teaching material. In this way, the interconnectedness among different subjects has been promoted through appropriate expansions of teaching themes and the overall general analysis of basic concepts, thus making inter-thematic approach to knowledge be projected on school practice, a process that enhances general education (YPEPTH, 2002, 2003).

In Compulsory Education, IT is taught as a subject in secondary schools and is introduced - with the present Greek Primary School Curriculum - to Primary School, following the "holistic model", according to which objectives are achieved and implemented by diffusing IT in different subjects. In the Curriculum, which has been implemented in the Greek Primary School, it is mentioned that the aim of teaching New Technologies (henceforth ICT teaching) in Primary School is to familiarise the pupils with the basic computer operations, make them develop skills of critical thinking, ethics, social behaviour and help them adapt actively and creatively at individual and group level (school adjustment). The special aim of introducing ICT to the Primary School is to familiarise male and female pupils with the basic computer operations and give them the opportunity to be in contact with its different uses as a visual means of teaching, a cognitive-explorative tool

as well as a tool of communication and search for information within the framework of everyday school activities with the use of an appropriate software program and, more particularly, of an open software program of explorative learning (YPEPTH, 2003).

Nevertheless, in the Regular primary school teachers cannot use the ‘‘holistic model’’ because it is difficult for them to use ICT laboratories due to the lack of their own training, the aging of equipments, non-availability of suitable software, the difficulty with linking with the Internet and a not very good ratio of pupils students per machine (Grigoriadou et al., 2003; Koulaidis, 2006).

Moreover, Greek teachers' training in ICT - who are to apply it to the Primary Education - either is insufficient (in the present context, we are referring to Primary Education teachers), or the future Primary Education teachers are not trained in their Undergraduate Studies Programme (at the Greek Universities) as how to approach the new pedagogical and teaching theories (in the present context, we are referring to IT teachers) (Kynigos et al., 2000; Tzimopoulos, 2003).

2.2. IT Introduction to the Greek Public DLPS

The main use of ICT occurs in the Greek Public DLPS, which runs from when the Regular school ends until 16:00 late afternoon. Pupils attend the DLPS voluntarily. All participating pupils are placed in the same classroom. There are no separate classes, whereas the pupils are separated in different sections only if their number exceeds 60. Two main goals of the Greek Public DLPS are pupils' autonomous and responsible work and their preparation for next-day's classes under a teacher's guidance. During the school year 2010-2011, 800 new DLPS will be operating, where the compulsory programme (i.e. the Regular school) will start at 8:10 and finish at 14:00. Then, the pupils who are registered in the DLPS will remain at school up to 15:30 or 16:15, depending on the pupils' learning needs.

During the period that the research took place there was no autonomous IT subject in the Regular Primary School. From the school year 2010-2011 the MELLRA (Ministry of Education, Lifelong Learning and Religious Affairs) will integrate IT as an autonomous subject in the regular primary school programme. Of course, it is always possible for ICT to be used as a supporting learning tool, something that confronts many obstacles [e.g. high workload, low technical and administrative support, low self-esteem, etc. (Guha, 2000; Pelgrum, 2001; Slaouti & Barton, 2007).

Nevertheless, ICT is difficult to get integrated in the teaching of other subjects – despite the fact that the Primary School Curriculum provides for this integration – due to the lack of material and technical infrastructure. There is lack of PCs, classrooms and suitable practical guidebooks, since suitable teaching material - such as books, teacher's book, workbooks - has yet to develop, with the only exception of a software program that has already been developed (Giavrimis and Papanis, 2007). In Greece the use of ICT in the classroom is about 20%, a percentage much lower than the average in the EU (61%) (European Commission, 2006). According to the data of KEE [KEE in Greek: Centre of Educational Research] (Koulaidis, 2006), in the school year of 2003-04 the average percentage of school units that had PCs was 85.6% of the total of the schools in the country, of which 79.2% was that of primary schools. The ratio of pupils per PC was 23.7% in the primary schools, The average percentage of the PCs being linked with the Internet amounted in 67.1%, while the percentage of the PCs connected with a local network was 60.1%, with relative differences in the size among the educational levels (Koulaidis, 2006). Furthermore, 53% of the pupils/students claimed that they had a PC at home, which they use for their homework, whereas 36% stated that they were linked with the Internet at home.

In a report of the Eurydice Network (2005), it is mentioned that almost all 15-year old adolescents (99.31%) claimed that they had already used a PC at home, school or in another environment. The percentages are slightly lower in Slovakia (about 96%) and in Greece (98%). The percentages of pupils/students in Greece who stated that they had used a PC less than a year were about 20%, one of the lowest one in the EU. Of course, if this percentage is projected onto the (Greek) Primary School, it still gets

quite dramatic. In a research of the Observatory for the Greek Information Society (IS) (Observatory for the Greek IS, 2009a), it was found that the majority (85%) of pupils and students of 8-15 years old uses a PC, whereas their home is the most basic place of the use of a PC (87%) and accessibility to the Internet (79%). Fifty percent of the children have already attended a relevant seminar.

There were also statistical significant differences between genders regarding ICT literacy. Boys appear to have more advanced skills and competencies in using ICT than girls (Barkatsas et al., 2009; Vekiri & Chronaki, 2008). Moreover, 100% of the schools have equipped with PCs (the ratio of a PC per school is 13,2) and the ratio of pupils/students per a PC linked with the Internet is about 16 (Observatory for the Greek IS, 2009b). In the Primary school the ratio is even higher: 22 pupils per a PC. Finally, of the Greek households only 31% has access to the Internet (NSSG, 2008).

In the present article, we are presenting part of outcomes of a wider research that explores the ICT applications to (Greek) primary schools and their impact on teaching, learning and cognitive processes as well as on pupils' behavioural adjustment, according to primary school teachers and pupils of the 5th and 6th Grade. A Greek primary school (public and private alike) consists of 6 Grades. The research outcomes presented here concern the pupils' opinions on their degree of acquisition of basic ICT skills, as these skills are mentioned as to be acquired in the Greek Primary School Curriculum.

3. Methods

3.1 The Sample

The sample of the research consisted of 316 students, class units of the 5th and 6th Grade of the primary schools of Northern Aegean, Greece. The selection of the 5th and 6th Grades of the primary schools for the conduct of research was made because: a) The children of these Grades are able to fill in the questionnaires and express their opinion with clarity. b) The pupils had already been trained in New Technologies so they would be able to express their opinion with clarity on the introduction of IT to the Primary School and the relation of IT with their learning process and c) at this age, various school experiences had an impact on pupils. These experiences usually help the pupils acquire learning abilities, perceive themselves and understand their role as pupils.

Moreover, the area of Northern Aegean was selected because: a) the applied Greek regional policy was very general, without specifying the particularities of insular regions, even though there were such programmes (e.g. Integrated Mediterranean Programme (1986-1992), INTERREG, LEADER, etc), b) the Northern Aegean islands are the external borders of the European Union; and c) there are socio-economic and educational inequalities due to the insularity and geographical discontinuity of the region.

Concerning the selection of school units from which the respondents' sample was drawn, a stratified sample was used. At the first stage, the schools of research were selected based on the following criteria: geographical criteria, type of schools (the *one-graded school* which is the school in which the first 3 grades are taught in one classroom; the *two-graded school* which is the school in which the 1st, 3rd and the 5th grades taught in one classroom and the 2nd, 4th and the 6th grades are taught in another; the *three-graded school* which is the school in which the 1st and 2nd grades are taught in one classroom, the 3rd and 4th in another and the 5th and 6th grades are taught in another classroom; and the *six-graded school* which is the school in which each grade is taught in a separate classroom), school organisation, shift, day-long schools or regular schools. The selection of method – a multi- stratified one - ensured satisfactory representation for the given size of the sample, as it decreased the fault in sampling in relation to the selection of school units. At the second stage, random sampling was applied to the selected schools, so that it was to be decided which pupils would participate in the research.

Of the pupils, 153 (48.4%) were boys and 163 (51.6%) girls. Of them, 155 (49.1%) were in the 5th Grade and 161 (50.9%) in the 6th Grade. Moreover, of that sample of the pupils, 263 (83.2%) were not

studying in the DLPS, whereas 53 children (16.8%) were.

Concerning the educational level of the pupils' mothers, 64 (20.2%) completed the Primary School, 135 (42.7%) finished the Lyceum, 93 (29.4%) claimed that they had a Higher Education degree, while 24 (7.6%) pupils did not know their mother's educational level. As far the educational level of the pupils' father, 64 (20.2%) completed the Primary School, 127 (40.2%) finished the Lyceum, 89 (28.2%) claimed that they had a Higher Education degree, while 36 (11.4%) pupils did not know their father's educational level.

3.2 Questionnaire

During the research the Pupils' Questionnaire about ICT was used. Its structure was based on: 1) respective researches and findings of the international bibliography (Eurydice, 2001, 2004, 2005; Machin et al., 2006); 2) the Primary School Curriculum for the IT subject (YPEPTH, 2002, 2003) and 3) MELLRA's guidelines on the particular course.

Here we should note that the ICT skills that were assessed in this questionnaire were those that had been set as goals in the Primary School Curriculum and those that pupils should fulfill. These goals are the same for both grades; that is, for the 5th and the 6th Grades.

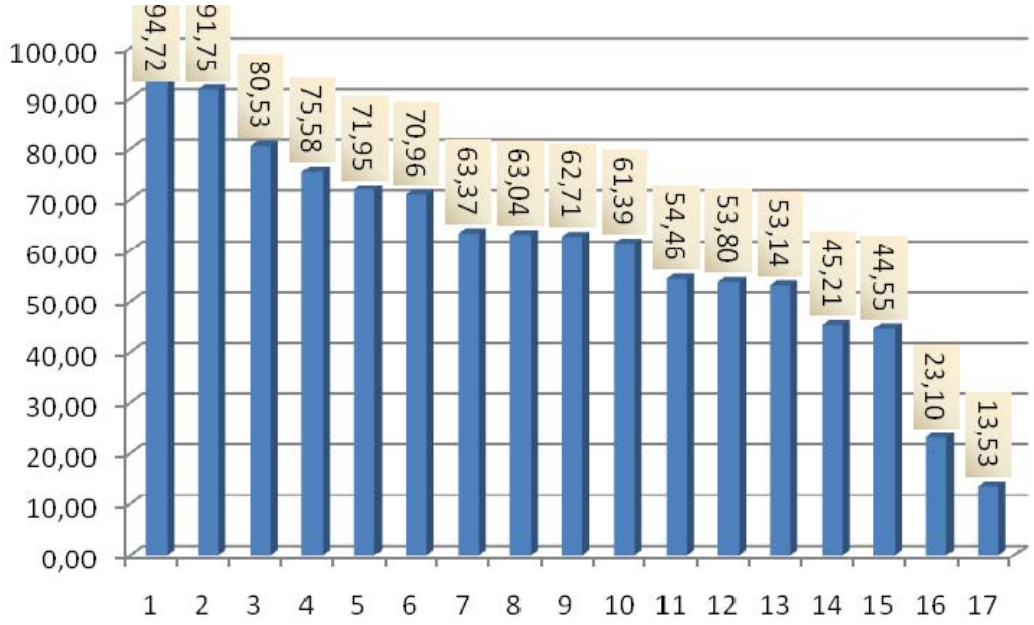
Furthermore, the questionnaire was given to thirty primary ICT teachers, who evaluated the scale's questions about the relevance of the content in the application of ICT to primary schools based on a five-point scale (1 = not relevant and 5 = completely relevant). An analysis of the results of evaluation (Mean = 4.8) showed the validity and adequacy of the content of the questionnaire ("Content validity"). In addition, the reliability coefficient for the split-half test found 0.89 and the internal consistency reliability coefficient was found 0.92. The Pupils' Questionnaire about ICT consisted of five thematic units and included closed questions. The first thematic unit referred to the acquisition of basic ICT skills, which are included in the Primary School Curriculum for IT and are fundamental objectives of the course. The second thematic unit consisted of two questions about the pupil's emotional connection or not with the subjects, in which PCs are used. The third thematic unit were of questions about the role the use of a PC plays in the pupils' school adjustment. The fourth unit referred to how long the pupils use a PC either at school or in their extracurricular activities. The fifth unit had questions about modern teaching and the knowledge acquired through constructionism and critical thinking. At the beginning of the questionnaire there were demographic questions (pupils' sex, Grade, participation or not in the DLPS, parent's educational level).

4. Findings

According to the Curriculum, the Primary School pupils are introduced to basic ICT skills. Thus, in the questionnaire we included these skills and asked the pupils to state whether they had or they had not acquired these particular skills. We also requested the teachers assess the skills the pupils had acquired, so we would get an overall picture from the assessment of these skills that would also be reliable.

For the analysis of the particular categorical variables, in which the pupils' answers were ranged between the bipolar "Yes - No", we opted to separate the affirmative answers - that is, those in which the pupils stated that they had acquired the particular skills – from the negative ones. Based on this categorisation, we classified the skills in Figure 1, where the hierarchy denotes the degree of pupils' acquisition of ICT skills. Thus, we observed that 75% of the pupils and beyond knew how to turn on and turn off a computer, how to use the "Painting" software program, and the parts of a computer and how to make triangles with the aid of a computer. From 50% to 75% of the pupils knew how to store the files where they wanted to; how to insert **bold** or *italics* in their texts; how to use the printer; how to write texts in the "Word"; how to find information about their homework in the Internet; how to maximise or minimise a window of operation in the computer; how to insert pictures in their texts; how to make calculations with the aid of the PC calculator; and how to find addresses in the Internet.

Figure 1. Pupils' positive answers to Basic ICT Skills



1. I know how to turn on and turn off a computer; 2. I know how to use the "Painting" software program; 3. I know the parts of a computer; 4. I can make triangles with the computer; 5. I know how to store my files where I want to; 6. I know how to insert **bold** or *italics* in my texts; 7. I know how to use the printer; 8. I write texts in the "Word"; 9. I know how to find information about my homework in the Internet; 10. I can maximise or minimise a window of operation in the computer; 11. In the texts I write on the computer I can also insert pictures; 12. I make calculations with the calculator of the computer; 13. I know how to find addresses in the Internet; 14. I know how to make the invitations for my school celebration on the computer; 15. In order to do my homework I also use the computer at home; 16. I am communicating with my friends with electronic mail (e-mail); and 17. I know how to use the "Logo" software program.

Finally, less than 50% of pupils knew how to make invitations in the computer for their school celebration; how to communicate with their friends through e-mail; and how to use the "Logo" software program. From the preceding, it becomes obvious that the total of almost all pupils had acquired the simple ICT skills, whereas when we dealt with more complex skills we came to realise that the percentage of pupils that had acquired these skills decreases, even though these skills are included in the Primary School Curriculum for the IT subject (Figure 1).

4.1 Grade

We also examined the pupils' opinions on the acquisition of basic ICT skills in relation to the grade they were in. From the examination with the criterion Phi-Cramer's V and the analysis of the outcomes, which are presented in Table 1, we observed that the pupils presented important differences in the following skills: "I know how to use the printer"; "I write texts in the "Word" "; "I know how to find information about my homework in the Internet"; "I know how to find addresses in the Internet"; "I know how to store my files where I want to"; and "I know how to insert **bold** or *italics* in my texts". In the above variables, it is discernible that the 6th Grade pupils had acquired more skills than those of the 5th Grade, whereas there was no differentiation in the rest of basic skills either because the pupils had acquired them or because they felt the lack of these skills to the same degree.

Table 1. Grades and positive responses to basic ICT skills

QUESTIONS	Grade 5	Grade 6	Phi Cramer's V	Asymp. Sig. (2-sided)
1. I know how to turn on and turn off a computer.	90.20%	93.70%	0.065	0.253
2. I know how to use the printer.	52.90%	71.60%	0.193	0.001*
3. I can maximise or minimise a window of operation in the computer.	58.40%	63.90%	0.056	0.327
4. I know how to use the "Painting" software program.	86.90%	92.40%	0.089	0.116
5. I write texts in the "Word".	55.60%	68.60%	0.134	0.019*
6. I make calculations with the calculator of the computer.	47.40%	58.30%	0.110	0.054
7. In the texts I write on the computer I can also insert pictures.	53.60%	54.20%	0.006	0.923
8. I know the parts of a computer.	76.30%	82.10%	0.071	0.215
9. In order to do my homework I also use the computer at home.	41.40%	46.20%	0.047	0.405
10. I know how to make the invitations for my school celebration on the computer.	40.80%	47.80%	0.070	0.217
11. I know how to find information about my homework in the Internet.	52.60%	70.10%	0.179	0.002*
12. I know how to find addresses in the Internet.	40.50%.	63.10%	0.225	0.000*
13. I know how to insert **bold** or *italics* in my texts.	59.50%	79.50%	0.217	0.000*
14. I know how to store my files where I want to.	62.70%	77.70%	0.164	0.004*
15. I know how to use the "Logo" software program.	13.20%	13.40%	0.002	0.973
16. I can draw triangle with the computer.	71.20%	76.90%	0.065	0.254
17. I am communicating with my friends with electronic mail (e-mail).	18.30%.	26.80% .	0.101	0.075

Note: 1= No, 2= Yes

4.2 Pupils' Participation or not in the DLPS

Moreover, we examined the pupils' opinions on the acquisition of basic ICT skills in relation to whether they studied or they did not study in the DLPS. A comparison of the figures is important because IT is taught as an autonomous subject in the DLPS. Examining with the criterion Phi-Cramer's V and analysing the outcomes presented in Table 2, we observed that the pupils did not present important differences in the use of the skills, either because they had already acquired them or because they felt they lacked these skills to the same degree.

Table 2. *Participation in the DLPS and positive responses to basic ICT skills*

QUESTIONS	Regular (School)	All-day (School)	Phi Cramer's V	Asymp. Sig. (2-sided)
1. I know how to turn on and turn off a computer.	90.70%	98.10%	0.102	0.071
2. I know how to use the printer.	61.20%	67.90%	0.053	0.356
3. I can maximise or minimise a window of operation in the computer.	60.70%	63.50%	0.021	0.711
4. I know how to use the "Painting" software program.	88.70%	94.30%	0.070	0.220
5. I write texts in the "Word".	60.50%	70.60%	0.077	0.177
6. I make calculations with the calculator of the computer.	51.40%	60.40%	0.068	0.232

7. In the texts I write on the computer I can also insert pictures.	52.40%	61.50%	0.069	0.226
8. I know the parts of a computer.	77.30%	88.70%	0.106	0.062
9. In order to do my homework I also use the computer at home.	42.80%	49.00%	0.047	0.414
10. I know how to make the invitations for my school celebration on the computer.	44.10%	45.30%	0.009	0.879
11. I know how to find information about my homework in the Internet.	62.30%	57.70%	0.035	0.537
12. I know how to find addresses in the Internet.	53.70%	43.40%	0.078	0.172
13. I know how to insert **bold** or *italics* in my texts.	68.50%	75.00%	0.053	0.352
14. I know how to store my files where I want to.	70.80%	67.90%	0.024	0.675
15. I know how to use the "Logo" software program.	12.90%	15.10%	0.024	0. 675
16. I can draw triangle with the computer.	73.00%	79.20%	0.053	0.348
17. I am communicating with my friends with electronic mail (e-mail).	21.40%	28.30%	0.062	0.274

Note: 1= No, 2= Yes

5. Conclusions

In the present article, we have presented the research outcomes concerning the pupils' opinion on the degree of their acquisition of the basic ICT skills, as these skills are described in the Greek Primary School Curriculum. The Curriculum and, consequently, the books address those pupils who have got satisfactory knowledge of IT and access to a PC and the Internet.

From the outcomes of the present research we can observe that: (1) almost all pupils acquire Basic ICT skills (e.g. turning on/off a computer, use of the "Painting" software program), whereas a decreasing percentage of pupils acquire more complex skills (e.g. use of e-mail and the "Logo" software program). Most pupils manage to acquire Basic ICT skills without attending an autonomous (IT) subject being taught in the regular school and without using ICT that was incorporated in the other subjects to the degree it should have been (even though this is referred to the Primary School Curriculum for the IT subject). However, the pupils had failed to fulfill all the requirements and meet the goals set by the Curriculum in the same way. Primary School Curriculum for the 5th and 6th Grades takes for granted that (1) the pupils of these Grades have acquired a good deal of basic ICT skills, which are related primarily to the use of a PC and the management of the Internet; and that (2) the older the children are, the better they acquire ICT skills related to peripherals (e.g. printer), digital programs (e.g. "Word", the Internet) and processes (storage of files, use of **bold** or *italics* in the texts). According to the Curriculum, the pupils of the 5th and the 6th Grades are expected to have acquired the same skills as those to which the Curriculum refers.

Trying to explain the above discrepancy, we can say that: (a) in every field education has delayed to incorporate new cognitive tools in teaching practices, in relation to depth and width is needed (Levine & Levine, 2002); (b) there is a negative attitude on behalf of the teachers towards integrating ICT in education, which lies in their lack of knowledge, low self-esteem, and their persistence on traditional teaching methods (Chatzilakos et al., 2001; Lai et al., 2001); (c) teachers' initial education and training is not sufficient to make deal with the rapidly changing social conditions, changes in knowledge and both in the Curriculum and the new teaching-pedagogical approaches introduced (Borko, 2004), whereas the form of in-service training cannot contribute significantly to the introduction of ICT to education (Chatzilakos et al., 2001; Kynigos et al., 2000); and (d) in Greece ICT laboratories confront problems of aging equipment, non-availability of suitable software, difficulties with linking with the Internet, whereas the ratio of the pupils / students per PC is not the best (Grigoriadou et al., 2003; Koulaidis, 2006). Trying to tackle these problems, from the school year 2010-20, the Ministry of Education, Lifelong Learning and Religious Affairs (or MELLRA in Greek) decided to

change the Time Schedule of the Regular School and integrate ICT in the Syllabus of the Regular Public school as well as to apply measures – such as, training teachers, introducing innovative activities, integrating new supervisory tools (e.g. interactive tables) and renewing and upgrading equipment through EU programmes – so that ICT is better used at Greek Public Schools.

Taking into account the findings of this research, we should note that the pupils' participation in the DLPS does not differentiate the ICT skills they have acquired from those pupils who study in the Regular school, despite the fact that ICT is taught as a separate subject only to the DLPS. Although this phenomenon can be puzzling at the first sight, there are two factors that can explain it: (1) the very presence of non-formal education and (2) cultural capital; both these factors are closely interrelated. Within the framework of non-formal education, the Greek family spends an enormous sum of money for the education of their children to cover educational goods that are not offered at all or are offered inappropriately or ineffectively by the educational system itself (NSSG, 2008; GSEE, 2008). Of course, this issue tackles upon wider socio-political issues of Greek society that go beyond the scope of this paper. Nevertheless, in the present context, it suffices to say that the great development of non-formal education in Greece is related to the little governmental spending on education, implying that the money that the Greek state does not spend for the education of its citizens is spent by the pupils' families. Thus, the families with a good financial standing are in a better and more advantageous position than those that are of low income, who can neither satisfy their children's educational needs easily nor be able to help their children build a substantial lead in an open and competitive market - the product of which is an education that will look like more with a consumer product rather than a good that has a public and social character. In addition, the gradual disengagement of education from its public character creates fertile ground for the development of speculative tendencies (within education itself) and imposes free market rules.

The second factor – the cultural capital of the Greek families – is tightly interwoven with the first one, that is, non-formal education. For decades now, Greek families believe that their children must be well educated. Greek parents have been investing in their children's education (Tzani, 2004; Fragoudaki, 1985), because they firmly believe that a good education is the best way for their children to integrate successfully in Greek labour market. Hence, non-formal education and cultural capital of the Greek families are so inextricably interwoven in the same tex*ture* / context of the Greek society that some primary school children seem to have – and have – acquired not only the basic but also the advanced ICT skills independently from the mainstreamed Primary School Curriculum for IT (Vekiri & Chronaki, 2008).

If we combine the above-discussed two factors (i.e. non-formal education and cultural capital) with the fact that the participation in the DLPS is not determined by certain social criteria, but it is rather random, and – despite the fact that the IT subject is taught as an autonomous course only in the DLPS, we can conclude that: (1) teaching techniques and pedagogical approaches to ICT as an autonomous the subject in the DLPS neither encourages the development of ICT skills nor makes any difference in development of ICT skills the among the pupils who study or those who do not study in this school. (2) The school does not seem to be the social compensatory factor that eliminates or does not reproduce structures of an unequal and class-divided society. According to Marxistm, education cannot be understood separate from social transformations (Giavrimis et al., 2009; Kelpanidis, 2002). Thus, it is connected with fundamental social and economic institutions and aims at perpetuating and reproducing the status quo, through the ideology of equal educational opportunities. Finally, the influence of the package of cultural capital that pupils carry with them does not seem to get convulsed by ICT teaching in the DLPS, since – as mentioned earlier – most of the children have started non-formal education on IT long before they get in the 5th and/or 6th Grade.

Therefore, considering the important impact that ICT has on modern societies, we should claim that it is important for the country wishing to have a say and play a role worldwide to invest in teaching ICT and its applications, creating and providing very good material and technical infrastructure and networking of school units, upgrading the support network (technical, administrative organisation) and in developing suitable teaching material both for pupils and for teachers. This teaching material should aim at optimising

educational processes and generating student- and cognitive-centred learning environments, developing authentic problematic situations of modern reality and adopting respective and remarkable assessment strategies of teaching efforts. It is also quintessential for every educational system to invest in the training of its teaching staff in ICT. Additionally, we should re-consider seriously the principles of Adult Education, while designing training programmes, selecting highly qualified trainers in Adult Education and giving the opportunity to the trainees to further practice when a trainer is present.

Undoubtedly, development of ICT skills and ICT in general could become an important lever of growth and progress for entire Greek territory, as the existing communication technologies can lend to educational practice and, more generally, to education (as an institution) such a role in an ever altered and transformed environment, thus counterbalancing the potentials each region of the country has and facilitating a truly decentralised development of education.

References

Barkatsas, A. N., Gialamas, V. & Kasimatis K. (2009). Learning secondary mathematics with technology: Exploring the complex interrelationship between students' attitudes, engagement, gender and achievement. *Computers & Education*, *52*, 562-570.

Borko, H. (2004). Professional development and teacher learning: mapping the terrain. *Educational Researcher*, *33*(8), 3-15.

Chatzilakos, T., Kynigos, C., Vavouraki, A., Ioannides, C., Papaioannou, P. & Psycharis G. (2001). *A Case study of ICT and School Improvement*. OECD/CERI ICT PROGRAMME.

Cox, M., Abbott, C., Webb, M., Blakeley, B., Beauchamp, T. & Rhodes, V. (2003). *ICT and Attainment: A Review of the Research Literature, ICT in Schools Research and Evaluation Series No.17*. Coventry/London: Becta/DfES

DfES (2003). *Fulfilling the Potential: Transforming Teaching and Learning Through ICT in Schools*. Nottingham: DfES Publications.

European Commission (2006). *Benchmarking Access and Use of ICT in European Schools 2006: Final Report from Head Teacher and Classroom Teacher Surveys in 27 European Countries*. [Online] Available: http://europa.eu.int/information_society/eeurope/i2010/docs/studies/final_report_3.pdf (March 25, 2007).

Eurydice (2001). *Basic indicators on the incorporation of ICT into European Education Systems: Facts and Figures 2000/01 Annual Report*. Brussels: Eurydice European Unit.

Eurydice (2004). *Key Data on Information and Communication Technology in Schools in Europe*. Brussels: Eurydice European Unit.

Eyrydice (2005). *How boys and girls in Europe are finding their way with information and communication technology?*. [Online] Available: http://youth-partnership-eu.coe.int/youth-partnership/documents/EKCYP/Youth_Policy/docs/Citizenship/Research/euridyce-study-on-IT.pdf (May 11, 2010).

Feenberg, A. (1991). *Critical Theory of Technology.* New York: Oxford University Press.

Fragoudaki, A. (1985). *Sociology of Education: Theories of social inequality at school*. Athens: Papazisis.

Giavrimis, P. & Papanis, E. (2007). The institution of the day-long school as a prevention factor of social and educational exclusion. Empirical data of Northern Aegean teachers' opinions on the function and the objectives of the day-long school. *Epistimes tis Agogis, 2*, 151-160 (in Greek).

Giavrimis, P., Papanis, E. & Roumeliotou, M. (2009). *Issues of Sociology of Education.* Athens, Greece: Sideris (in Greek).

Grigoriadou, Ì., Gogoulou, Á., Gouli, Å., Daglinelis, Â., Komis, Â., Kordaki, Ì., Mikropoulos, Á., Mpakogiannis, S., Papadopoulos, G., Politis, P., Sfikopoulos, Th. & Tzimogiannis, Á. (2003). ICT in education: Current situation, problems, suggestions. 2nd Conference of didactic of Informatics, Volos, October 2003 (in Greek).

GSEE (General Confederation of Greek Workers) (2008). *Expenditures of Greek Families for Education.* Athens: GSEE: Centre for Development of Education Policy (in Greek).

Guha, S. (2000, November 8-11). *Are we all technically prepared? Teachers' perspectives on the causes of comfort or discomfort in using computers at elementary grade teaching*. Paper presented at the Annual Meeting of the National Association for the Education of Young Children, Atlanta, GA.

Ioakimidis, P. (2008). *The Lisbon Summit.* Athens: Themelio (in Greek).

Kapsalis, A. (2006). *Educational psychology.* Thessaloniki: Kyriakidis (in Greek).

Kelpanidis, M. (2002). *Sociology of Education. Theories and Reality*. Athens: Hellinika Grammata (in Greek).

Koliadis, Em. (1995). *Theories of Learning and educational practice.* Athens: Aytoekdosi (in Greek).

Komis, Â. (2006). Introduction to the Didactics of Informatics. Athens: Kleidarithmos (in Greek).

Koulaidis, Â. (ed.) (2006). *Mapping the educational system at the school unit level*. Athens: ÊÅÅ (in Greek).

Kozma, R. (2008). Comparative analyses of policies for ICT in education. In Voogt J. & Knezek G. (eds.), *International handbook of information technology in primary and secondary education* (pp 1083-1096). Berlin: Springer Science.

Kozma, R. (ed.) (2003). *Technology, innovation, and educational change: A global perspective.* Eugene, OR: International Society for Educational Technology.

Kynigos, P., Karageorgos, D., Vavouraki, A., and Gavrilis, K. (2000). The views of the teachers of "Odysseas" on the use of new technologies in education. *Proceedings of the 2nd Conference with international Participation: ICT in Education.* Patra. Retrieved

June 25, 2009, from http://www.clab.edc.uoc.gr/hy302/texts/patras/03sinp.htm (in Greek)

Lai, K.W., Pratt, K., & Trewern, A. (2001). *Learning with technology: evaluation of the Otago secondary schools technology project.* Dunedin: The Community Trust of Otago.

Levine, D., & Levine, R (1996). *Society and education*. Boston: Allyn & Bacon.

Machin, S., McNally, S. & Silva, O. (2007). New Technologies in Schools: Is There a Payoff? *The Economic Journal, 117*(522), 1145-1167.

Michailidis, P.G. (1989, November 27-28). *Issues from the Introduction of ICT to Schools*. Paper presented at the International Conference entitled Information Technology in Primary and Secondary Education. organized by Greek Association of IT Scientists in co-operation with YPEPTH [Ministry of Education and Religious Affairs] and the University of Athens (Eyrycleia Centre), Athens (in Greek).

NSSG [National Statistical Service of Greece] (2008). Research on Private Education and the expenditures of households at http://www.statistics.gr/ (in Greek)

Observatory for the Greek IS (2009a). *Analysis of survey results on the use of new technologies by children 8-15 years.* [Online] Available: http://www.observatory.gr/files/meletes/IS0KIDS_PT_ÐÁÉÄÉÁ & ÔÐÅ_VF.pdf (June 15, 2010) (in Greek)

Observatory for the Greek IS (2009b). *Report on the research findings among schools.* [Online] Available: www.observatory.gr/files/meletes/Õ14_EM_Ô×_EL_ÔÐÅ óôá Ó÷ïëåßá.pdf (June 15, 2010) (in Greek)

Ofsted (2004). *Report: ICT in schools - the impact of Government initiatives: Primary Schools*. London: Ofsted.

P.N.U.D. (2001). *Rapport mondial sur le développement humain.* Paris: De Boeck Université.

Papert, S. (1996). *The connected family: Bridging the digital generation gap*. Atlanta, GA: Longstreet Press.

Pelgrum, W. (2001). Obstacles to the integration of ICT in education: results from a worldwide educational assessment. *Computers and Education*, *37*, 163–178.

Ramboll Management (2006). *ELearning Nordic 2006: Impact of ICT on Education.* Denmark: Ramboll Management.

Rumpagaporn, M. & Darmawan, G. (2007). Students' critical thinking skills in a Thai ICT schools pilot project. *International Education Journal*, *8*(2), 125-132.

Slaouti, D. & Barton, A. (2007). Opportunities for practice and development: newly qualified teachers and the use of information and communication technologies in teaching foreign languages in English secondary school contexts. *Journal of In-service Education, 33*(4), 19.

Tissot, P. (2004). *Terminology of vocational training policy: A multilingual glossary for an enlarged Europe*. Luxembourg: Office for Official Publications of the European Communities.

Tzani, M. (2004). *Sociology of Education*. Athens: Grigoris (in Greek).

Tzimopoulos, Í. (2003). Teachers' training in ICT. The case study of the programmes of introductory training of Cyclades Prefecture. Patra: Hellenic Open University (MA Thesis) (in Greek).

Vekiri, I., & Chronaki, A. (2008). Gender issues in technology use: Perceived social support, computer self-efficacy and value beliefs, and computer use beyond school. *Computers & Education, 51*(3), 1392-1404.

World Bank (2009). *World Development Indicators 2009*. Washington: World Bank Publications.

YPEPTH [Ministry of Education and Religious Affairs] (2002). *ASPs. (Curriculums; APs in Greek) of Compulsory Education.* Vols. A and B. Athens: Pedagogical Institute (in Greek).

YPEPTH (2003). *IIFSPSPs* (*Intra-thematic Integrated Framework of Studies Programmes; DEPPS in Greek*). Athens: Pedagogical Institute (in Greek).