

## ***ICT Uses in Educational Context: Some Data and Reflections on Portuguese Reality***

---

**Jacinta Paiva**

*Universidade de Coimbra*

*Centro de Física Computacional e SPF – Softciências*

[jacinta@netcabo.pt](mailto:jacinta@netcabo.pt)

### ***Abstract***

Two general studies on Portuguese teacher and student attitude towards Information and Communication Technology (ICT) have been made in 2002, and in 2003 respectively. The Portuguese Ministry of Education supported both studies. The goal of the studies was to know more about the use of ICT by teachers and students, either at home or at school. Around 20 000 teachers and 60 000 students representing the whole country and all levels of education excluding high education, answered to a questionnaire.

The results of both studies are presented here. The discussion of data includes some general reflections and perspectives about the Portuguese reality and the future of ICT on Education.

### ***Keywords***

Educational ICT use, teachers and students, Portugal, attitudes towards ICT

## ***Previous Note***

There is in Portugal, since 1996, a state organization, linked to the Ministry of Education<sup>4</sup>, dedicated to the information and communication Technologies in school and whose name is *Nónio*<sup>5</sup> – XXI Century (*Nónio*, 2005) which works with the Information and Communication Technologies in Education.

Among its many tasks, the *Nónio* – XXI Century Programme, presently dependent on the GIASE (Educational System Evaluation and Information Office) is aimed at working out studies on the ICT to improve the educational environment. This text is about two of those studies on the use of ICT by teachers and students in Portugal. These statistic surveys are a sequence of previous publications about ICT in basic and secondary schools, as well as about pre-service and in-service teacher training.

Studies were carried out during the school years of 2001/2002 and 2002/2003 and besides the support of the *Nónio* Programme, its performance was only possible thanks to the Teaching Group of History of Sciences from the Computational Physics Centre of the University of Coimbra.

## ***Introduction***

In Portugal, many steps have been taken lately, not only in what concerns the *hardware* equipping of schools but also in the teacher training on ICT. We are aware of the long way still to be covered so that the cross-curricula ICT integration becomes systematic and planned, instead of being occasional and spontaneous.

Our starting point was that the ICT use in educational context is today a useful tool for teachers and students as individuals and as a team establishing a pedagogical relationship. Thus, it was necessary to know how teachers and students feel and use the ICT in their private life and at school. This was the main aim of the studies; to quantify how teachers and students use (or don't use) the ICT for their own benefit and at school. We present all the procedures we had to take into account spread to launch the studies based on two questionnaires; one filled by teachers and the other by students. The studies' description will be brief, as we wish to focus on the results and main conclusions.

The studies presented here concern the school year of 2001/2002 and refer to 19 337 teachers' answers from a sample of 26 707 teachers of 2 499 schools from every typology except for higher education, private and public schools in Continental Portugal (Paiva, 2002) and in the school year of 2002/2003 where it has been collected information of 59 488 students from the 4<sup>th</sup>, 6<sup>th</sup>, 8<sup>th</sup>, 9<sup>th</sup> and 11<sup>th</sup> years, from a sample of 84 757 students (Paiva, 2003).

---

<sup>4</sup> The Portuguese Ministry of Education only surveys non-higher education

<sup>5</sup> The *nónio* is a great precision instrument, invented by the Portuguese mathematician, geographer and pedagogue Pedro Nunes (1502-1578). This programme of spreading, supporting and studying of the ICT assumed his name as a symbol of precision and a better awareness of the surrounding world enabled by the ICT

## ***The studies***

### **Aims**

Some common objectives presided to both studies:

- To find out how many and what was the personal computing equipment used by teachers, students and their families.
- To characterize in a qualitative and quantitative way the personal context in which students use the computing devices.
- To infer how teachers and students access their training in ICT.
- To infer how the computer is used at school by students.
- To infer in which context computers are used by students at school.
- To relate some of the variable with age and gender.
- To infer from what teachers and students think about ICT and its potentialities for their working life and students' life.

### ***Specific objectives for the students' study:***

- Quantify the number of weekly hours spent at the computer performing school tasks, playing games, surfing the net, chatting, etc.
- Relate variables such as: have computing devices, how and how long computer and Internet are used at home and at school according to school year and the social developing index (SDI)<sup>6</sup> of the county where students belong to.

## **Description of the studies**

### **Teachers**

Universe– Every teacher of every teaching level except for higher education, from Continental Portugal, teaching at private or public schools during the school year of 2001/2002.

Sample – 26 706 teachers of 2499 schools

Answer rate – 72,4 % (19 337 valid answers)

### **Students**

Universe– Every student from Continental Portugal except for higher education attending private or public schools during the school year of 2002/2003

Sample – 84 757 students of 4th, 6th, 8th, 9th and 11th form from 1355 schools of the 2499 used in the teachers' study.

Answer rate – 70,2 % (59 488 valid answers)

---

<sup>6</sup> The social developing index (SDI) is an index composed by these parameters: life expectancy at birth, educational level, and comfort and sanitation. It is legally defined in counties, for Portugal. We, have grouped the SDI values, in four levels (concerning value intervals) since a low development and bad life conditions (SDI1) till a quality level life in all aspects (SDI4), with intervals of intermediate IDS values, the SDI 2 and SDI 3, respectively.

## **Method in the information gathering**

As for the methodology adopted to deliver the questionnaires to teachers and students we have sent them by post mail, in packages, addressed to the school board of each of the schools from the sample. Each package contained: an official letter with the grounds and aims of the studies, respective number of questionnaires for teachers and students, answering sheets for students (to be given to teachers who supervise the class filling the questionnaires) and one or more addressed envelopes previously identified with the school to be returned.

The information gathering was carried out during more or less five months for both studies.

After all the procedures and the questionnaires' reception, we verified, validated and registered all the information obtained.

## **Some Results/conclusions**

### ***Use of ICT by Portuguese teachers***

All the data that follows was gathered from a sample of 20 000 teachers of all school levels (pre-school, 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> cycle and secondary) and concern the school year of 2001/2002.

1. The majority of the sample is made up by women (76%), they are almost exclusive in pre-school teaching, followed by the 1<sup>st</sup> cycle (primary school).
2. The most represented range of age is 36-45 (34%) while the least represented is that made up by people more than 56 years old, 65% of teachers was between 26 and 45 years old.
3. The majority (about 90%) of teachers had initial teacher training. More than half of the teachers of our sample had done their initial teacher training at a university.
4. The majority of teachers (88%) own a PC and simple peripherals like:
  - a. 83% printer
  - b. 57% Net connect
  - c. 43% Scanner
  - d. 14% DVD
  - e. 27% CD-RW
5. About half (49%) of the teachers had self-learning in ICT and:
  - a. 38% family/friend support
  - b. 22% at University
  - c. 32% ME (Ministry of Education) training
  - d. 18% other teacher training.
6. Although for most teachers (91%) the computer is a personal tool, its general use depends on the gender, age, initial training and teaching levels. Thus, male younger teachers had their computer training at the university and used more often the PC for a general purpose in 3<sup>rd</sup> cycle and secondary schools.

7. Almost half of the teachers use quite often the PC but 31% only uses the *Word* application. About 65% of teachers use the Internet. Only 29% use the Internet at school but half of the teachers use it at home.
8. Less than half of the teachers use e-mail (44%), mainly just to communicate with friends. It is insignificant the use of e-mail from teachers to students (3%).
9. Surfing the Internet is mainly done by teachers at home. The e-mail, in particular, is mostly used by teachers of 3<sup>rd</sup> cycle and secondary.
10. The Internet is more used by teachers, for private and pedagogical purposes, as the teaching level goes up.
11. Only a quarter of all teachers use the PC with students, in school, in or outside classroom.  
From the 26% of teachers who use the PC with students, 42% belong to the 1st cycle (primary) and 24% to the 3<sup>rd</sup> cycle of basic and secondary.
12. The ICT application (software) most used by students, when teachers use a PC in class, is the word processor, mainly in the 1st and 2nd cycle of basic teaching. Pedagogical software, for example, is used less frequently.
13. The larger obstacles to the use of ICT, from the point of view of teachers, are the lack of resources, mainly technical but also human resources.
14. Almost all teachers, without distinction of age and levels taught, need and wish to have training in ICT applications.
15. Teachers have, in general, more positive than negative attitudes towards ICT. However, many female teachers show negative attitudes. The two main obstacles for integrating ICT in schools are the lack of technical means and human resources.
16. Teachers of the 3rd cycle and secondary schools use more their PCs to accomplish several private tasks.

### ***Use of ICT by Portuguese students***

From the analysis of the answers of the 59 488 students, divided by five school grades (4th – 10 674, 6th – 13 710, 8th – 13 042 and the 11th – 8 140), and concerned the school year of 2002/2003, some important results come out:

1. 64% of students' families have a computer<sup>7</sup> and:
  - a. 59% a printer,
  - b. 31% a scanner,
  - c. 36% Internet connection,
  - d. 51% CD-R and CD-RW,
  - e. 19% photo or video digital camera
  - f. 28% of families do not possess any of this equipment.

---

<sup>7</sup> The availability of computer hardware by families has substantially improved in the latter years: in 2001 the percentage of computers was of 39% and the percentage of Internet connection was 30% for the Portuguese population in general.

2. The equipments own by families depend not only on the school grade their children are attending (Figure 1) but also on the county's SDI.

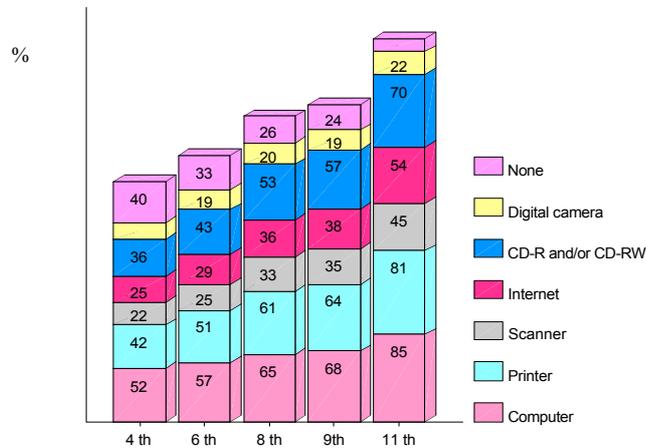


Figure 1 - Distribution of computer equipment by the attended school grade.

3. As for the equipment that belongs to the students themselves, we verified that:
- 55% of the students have computer,
  - 71% mobile phone,
  - 53% console,
  - 30% Game Boy,
  - 23% game accessories and
  - 9% do not have any of this material.

In what concerns the equipment relationship with SDI, one notices that mobile phone, consoles and Game Boy depend less on SDI than the computer.

- 60% of the pupils who use computer at home (we recall that 36% do not have and 5% do not use it), 46% use it for Word-processing and 43% for playing. Internet use comes next with 30%, educative games with 18% and e-mail with 19%. Surfing in the Net appears quite often in the 11th grade.
- What students most enjoy doing with computers is playing - 27% - and in the 8th, 9th and 11th grades their preference goes to chats. Word-processing had 8% of choices, search in the Net 5%, play educational games 2% and send e-mails 1%. We checked the predominance of the entertainment (27%) against educational games (2%). Games are more appreciated by boys, in particular those who use the computer for longer periods.
- In families, which own computers (64%), 27% of the parents do not use the computer, 17% use the computer but not the Internet and 20% use the computer and the Internet. We verified that, in the families, the computer serves mainly the youngsters, in particular those in the higher school grades.
- 44% of the parents find important that their children learn how to work with computers. This percentage increases with the school year and varies very little with the SDI. The initiation of students to computer work was as follows: self-

learning 44%, with the family 33%, with teachers 23%, with friends/colleagues 19%, and 10% have not learned anything yet. Self-learning is more frequent in 9th and 11th grades. The influence of the teacher is very significant for the students in 4th grade, less significant for the ones in 6th grade and residual in 8th and 9th grades (17-18%). For students of the 11th grade teachers' influence has some importance (28%), in particular for the SDI1 and SDI2 groups. We verified a larger influence of families in the initiation to computers of younger students (attending the 4th and 6th grades) but of high SDI. Boys tend to self-learning more than girls.

8. At home, 53% of students perform their homework with computer help, 58% play, 44% surf in the Net and 30% participate in chats.
9. Weekly time spent to perform computer tasks (study, play, Net surfing, chatting) is very small, even if one considers the activities students enjoy doing. This may be due to the cost of staying on-line.
10. Only 39% of students of 8th, 9th and 11th grades (in a total of 48 814 students) take advantage of e-mail, mainly to communicate with friends and always in high SDI regions (broadband width only exist for SDI3 and 4). Teachers almost do not use e-mail.
11. School computers are mainly used during classes (strict disciplines and/or educative complements) and free time. In the former the prevailing use in non-disciplinary areas (Project Area, Accompanied Study and Civic Training) with the exception of the 4th grade. Although not very intensively, scientific disciplines are those which use most the computer.
12. The distribution of computer used along the different school activities in all school grades (in the 8th and 9th grades this relation has no expression) show an interesting SDI dependence (Figure 2).

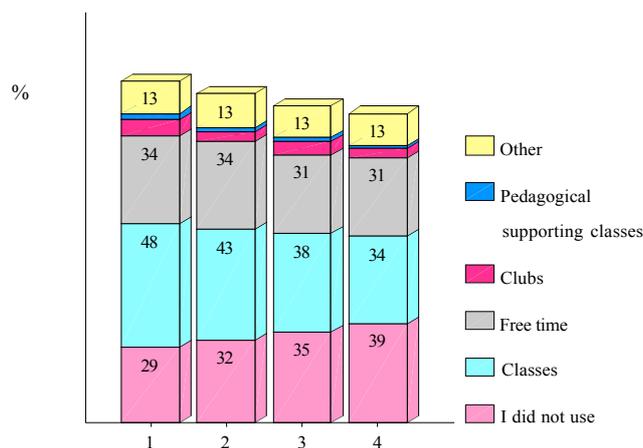


Figure 2 – Distribution of computer use in schools by SDI.

13. 6% of students in the 4th grade say that computers in their schools are out of service, 15% stress the need for equipment upgrade and 27% say they do not have Internet or that it does not work.

14. The frequency of computer use in schools is 14% for “once a week” and 8% for “less than once a month”. A surprising fact is that the frequency of computer use in schools decreases with SDI.
15. Only 26% of students can use computers and Internet at their schools when they do not have classes or whenever they want to. What students most do with computers at school is Word-processing, Internet surfing, game playing and chatting. They do at schools the same activities they do at home.
16. 24% of students in the 4th grade 18% of the 6th grade, 31% of the 8th grade, 27% of the 9th grade and 17% of 11th grade have never used computers.
17. Students think that teachers do not use computers at school mainly because computers are lacking (61%). 36% say that teachers “have to teach the syllabus”.
18. 82% of students consider that it is not important to know very much about computers to be a good student.

### **Reflections about ICT / School**

After presenting a summary of the studies (Paiva, 2002), (Paiva, 2003a), (Paiva, 2003b) e (Paiva, 2003c) I propose to write with some freedom about some of the clues of possible reflections concerning the ICT, but these are far beyond them.

We cannot be simplistic: the real integration of ICT so often centred in teachers, in the subjects and in the computing equipping of schools, is in fact comprised in a very complex whole dependent on several variances which include among others, teachers, students, school computing substructures, socio- cultural- economical level of students’ families, other educational agents and individual and sentimental differences and motivations. After this description I feel it would be thoughtless to give too many suggestions. I believe it will be from the analysis of the variances’ relations in each school on that the use of the ICT will be improved by students and teachers and the rest of the education community. I myself matured my whole position, think the whole and assume it is always more than the sum of the parts, as assuming the deceit that is “see” realities (ours and the world’s) with our ancestors’ eyes. By the way, I would like to refer to Peter Senge (1990) about this way of thinking the world, things and ourselves.

To Senge, learning is a process of growing up integrated integrant of the individual and his neighbourhood. This process involves, on people side, the development of “organizational” learning techniques gathered by Senge in five “subjects”.

The subjects are a set of learning practices, through which each individual modifies him/herself, acquiring new skills, knowledge, experiences and awareness levels about him or her. When they are developed together they may they have a significant and measurable impact on our performance. The efforts of developing learning skills mix up behaving and technical changes. This way, when I am learning something new, I am also calling in question myself, working inside my presuppositions. There are some “rules” for the fifth subject. The last, especially, fascinates me, intrigues me but it also comforts me. We can call it “There is no one to blame at”. Our tendency is to blame the external circumstances (people or situation) for our problems. But there is in fact no “out side”, we and the cause of our problems are a whole of the same system. The cure is in the relationship with the “enemy” that after all lives inside us. Extending this point to institutions we tend to blame those who are above us, chiefs, and bosses. We could at

first ask to what extent we contribute to our own problems. Obviously, at this point, we are not talking about problems out of our control but about situations that involve human relationship. In this case we always have a choice...

I now propose to travel inside myself as a human being and share with you the shadows, colours and transparencies, so that getting to know myself better, I may understand better the others and above all the School institution that is a set of “*nós*” (a quibble in Portuguese meaning at the same time *we* and *knot*) and of others... Reflect on the impediments, obstacles, the “no” and the reticence to act in a better way. Reality, individual and/or collective, is always complex. Nothing is simple or ruled by twofold logics.

My school in particular, while an “I” community a danger of uniform treatments, of assembly line bets as “student in+ICT – ICT student out” are enormous... And this is probably my first reflection; there is an essential dialectic between pedagogical innovation and the ICT: the ICT may innovate school but school will hardly embody the ICT if it doesn’t open to innovation! But how are going to innovate? Very often through imitation. Innovate is not to universalize a practice that was profitable. We innovate in an institution and personal way. What is good for me and produces good results for me may be awful to another one.

To introduce changes according to people and not “create the change” and then fit people to it... This aspect forwards us for the school projects, for the autonomy and for the responsibility of educational agents that increases as you act like this, that is urgent to rescue and for which is worthwhile give a voice.

A second clue: how we think and put in practice learning, cooperation and learning communities concepts, which I believe are unanimous for all of us.

To look inside us, outside myself, inside the others, to things and situations and integrate all that in my being, will be learning.... But it will only be truly learning, if it also involves dialogue practice and if it generates a flow of ideas among people. Thus learning becomes a creative process for each one and for the group too. This way the world, the school, the family and the individual are not tight and distinct entities that communicate from time to time but they become interdependent and dynamic entities, fundamental elements of the same community (the learning one) that places and fundamentals the citizen development, allowing man to co-create and co-share his present as well as his future.

As we are developing in schools the contents and contexts which allow to enable the conditions and environment for acquisition of knowledge and skills, as well as a personal growing, the reflection, the open horizons, summing up, learning to know, learning to do, learning to live together and learning to be (Delors, 1996).

By this time you will be thinking, I am sure, that nothing of this has got any sense. And worse, it has nothing to do with ICT. On the contrary, everything has to do with everything... and the ICT revolution will happen in a slow evolution but very desired. In another way it is an artifice, it is obligation and it is ruled by a manual agenda, calendar... in a heedless and mute way in the same way many of us behave in this or that behaviour side to himself or to the world...

I was not the first to say it, I heard it from someone else, but I got quickly fascinated by it: the great beauty of the ICT is that it allows men and women to be closer, at the distance of a click, it is to cut, paste, build very quickly, it is to read, to see, to travel

outside and inside of yourself, quickly and comfortably... and above all to be able to share quicker, time, words, money, attention, work...

A computer is so much better when I try all those possibilities in a bigger and closer relation with the others and with the world. Other way it is only a mere artefact that I use, because everyone does it, because it has to be, because it is compulsory or else I will not be promoted in my job as I lose my statute...

The third reflection proposal is: how to transmit all this to schools, to students, to their families? Not using the computer for the false and modern plausible excuse... but for the real possibilities of relationship with people, the things and the world enabled by this machine. This, as many other things only happens when you live and feel. Let us say it in a prosaic way; we just pass through the example... And the example is not for sure in the way I depend on my portable, on my notepad, on the Internet, how I handle bytes, but it is in the humanity how I live each thing from the computer or not.

We are always asking more to School, more to teachers, more to the staff, more to students, more to ourselves. It is now time to begin asking School and ourselves another thing, to ask differently... This different can contain some more. In education, to ask different is also to place you available to point to ourselves and to our students the ways instead of the solutions.

I will finish with an analogy comparing the future of the ICT in Education with the holidays (not so far away). Holidays are naturally time of changes, even if it is only a weekend, a day... Imagine we were going to travel. The simple fact of wanting to go implies preparations, decision, luggage (suitcases or a simple coat), itinerary choices, destinations, booking dates and so on. All this takes time. Most of the times, holidays are desired by people, well defined according to your needs, preferences and possibilities of who is travelling. So, there are no universal destinations, but more or less stunning holidays, possible holidays or even planned holidays. The same way ICT in School need to be prepared or planned.

Let us begin within ourselves... what do I refuse to "see", what fears, what constraints prevent me and my students of clearing a new and different way?

If I dare to share what I feel I will discover that my feeling is similar to the others and most of us do not want to go wrong, to be exposed to critics and not to control the situation...

Data shown about the use of the ICT in Portuguese schools, reveal reality, are inevitable. They evidence some intent but also worry and we acknowledge that there is still a lot to do. We have to improve, to change, beginning by ourselves and if we dare not grow up, we will not be able to offer the others, real opportunities of growing up too.

## References

- Delors, J. et al. (1996). *Learning the Treasure Within*. Report to UNESCO of the International Commission on Education for the Twenty-first Century. France, UNESCO. [Online] Available: [http://www.unesco.org/delors/delors\\_e.pdf](http://www.unesco.org/delors/delors_e.pdf) [2005, April, 23].
- Nónio, (2005) [Online] Available: <http://www.dapp.min-edu.pt/nonio/defaulta.asp> [2005, September, 19].
- Paiva, J. (2002). As Tecnologias de Informação e Comunicação: Utilização pelos Professores. *Programa Nónio Século XXI*. Lisboa, Ministério da Educação (DAPP), [Online] Available: [http://www.dapp.min-edu.pt/nonio/pdf/utilizacao\\_tic\\_profs.pdf](http://www.dapp.min-edu.pt/nonio/pdf/utilizacao_tic_profs.pdf) (Portuguese version only). [2005, September, 19].
- Paiva, J. (2003a) - As Tecnologias de Informação e Comunicação: Utilização pelos Alunos. *Programa Nónio Século XXI*. Lisboa, Ministério da Educação (DAPP), [Online] Available: [http://www.dapp.min-edu.pt/nonio/pdf/estudo\\_alunos-v3.pdf](http://www.dapp.min-edu.pt/nonio/pdf/estudo_alunos-v3.pdf) (Portuguese version only). [2005, September, 19].
- Paiva J., Paiva J. C. & Fiolhais C.(2003b). The Use of Information and Communication Technologies by Portuguese Teachers. In M. Llamas-Nistal, M. J. Fernandés-Iglesias & L. E. Anido-Rifon (Eds.) *Computers and Education: Towards a Lifelong Learning Society*, (pp. 239-250). Dordrecht: KluwerAcademic Publishers.
- Paiva J., Paiva J. C., Fiolhais C., Mendes M. T. J. & Canavarro J. M. (2003c). The Use of Information and Communication Technologies by Portuguese Students. *Second International Conference on Multimedia & Information & Communication Technologies in Education, 2003*, Badajoz, Vol.I, 268-272.
- Senge, P. M., (1990). *The Fifth Discipline: The Art & Practice of Learning Organization*. New York, NY: Doubleday. '