PROJECT INTERNET CATALONIA (PIC)

SCHOOLING IN THE NETWORK SOCIETY:

Internet in primary and secondary education

Summary of the final research report

UOC
Universitat Oberta de Catalunya
www.uoc.edu

Generalitat de Catalunya

SCHOOLING IN THE NETWORK SOCIETY:

Internet in primary and secondary education

Summary of the final research report

Directors of the Project Internet Catalonia:

Dr. Manuel Castells, UOC professor and IN3 researcher
Dr. Imma Tubella, UOC professor and IN3 researcher

Research Directors:

Dr. Josep M. Mominó, UOC professor and IN3 researcher
Dr. Carles Sigalés, UOC professor and IN3 researcher

Authors of this research report and primary researchers of the PIC in primary and secondary education

Dr. Carles Sigalés, UOC professor and IN3 researcher
Dr. Josep M. Mominó, UOC professor and IN3 researcher
Julio Meneses, IN3 researcher

With the collaboration of:

Ferran Ruiz and Eva Borràs

With the support and sponsorship of:

Generalitat de Catalunya. Department of the Presidency
Generalitat de Catalunya. Department of Education
Jaume Bofill Foundation

Barcelona, April, 2007

Edition:
Publicacions a Internet
Gabinet de Comunicació

Universitat Oberta de Catalunya
Av. del Tibidabo, 39-43
08035 Barcelona
publicacions@uoc.edu
www.uoc.edu

Internet Interdisciplinary Institute (IN3)
Av. Canal Olímpic, s/n
Parc Mediterrani de la Tecnologia
08860 Castelldefels (Barcelona)
http://in3.uoc.edu

Editorial production: Eureca Media, SL
www.eurecamedia.com

Table of contents

Foreword

This research paper identifies and analyses the incorporation of the Internet into primary and secondary education in Catalonia and its relationship with the organisation, culture and educational practices prevailing in educational institutions. It is based on a survey using questionnaires for a representative sample of all of the primary and secondary educational centres in Catalonia. It is a study that, from the prospective of the directors, the teaching staff and students, tries to understand the level of internet use in the different areas of educational institutions and to what ends is it used. The study also analyses what type of presence the Internet has in the changes taking place in schools and in what way it contributes to the appearance of a new educational culture; one that is adapted to the needs that are starting to form in the information society.

Directors of the Project Internet Catalonia:

Dr. Manuel Castells, UOC professor and IN3 researcher
Dr. Imma Tubella, UOC professor and IN3 researcher

Research Directors:

Dr. Josep M. Mominó, UOC professor and IN3 researcher
Dr. Carles Sigalés, UOC professor and IN3 researcher

Authors of this research report and primary researchers of the PIC in primary and secondary education

Dr. Carles Sigalés, UOC professor and IN3 researcher
Dr. Josep M. Mominó, UOC professor and IN3 researcher
Julio Meneses, IN3 researcher

Research started:

July 2002

Research completed:

March 2007

1. Introduction

Next we present a summary of the final research report of the Project Internet Catalonia (PIC) on primary and secondary education. The summary contains a synopsis of the make up of the project, its objectives and the methodology used, as well as a presentation of the main results and conclusions.

Our research identifies and analyses the incorporation of the Internet into primary and secondary education in Catalonia and its relationships with the organisation, culture and educational practices prevailing in educational institutions.[1] The main priority of the research is directed at investigating the relationship that exists between different Internet users and the diversity of the most important activities within these institutions.

1.1. Goals

The goals of the research are linked to the three basic aspects of a school's activities:

- That of the teaching and learning processes, both in terms of the activities performed in the classrooms, as well as the outside resources the students and teachers can make use of.
- That of the organisation of the institutions, making special reference to the monitoring, management and supervisory systems of the educational activity, and the professional participation and collaboration systems among the teaching staff.
- That of the educational community’s configuration and dynamics. Information Communication and Technologies (ICTs from now on) can enormously strengthen the existence of integrated educational networks through different agents that directly or indirectly intervene in school activities: families, teachers, social workers, interconnected schools, associations, services, administrations and businesses.

The goals are achieved by:

- Describing the features of the technological infrastructure that are available to the different educational institutions

1. Throughout this report we interchangeably use the terms, centre, educational institution, educational centre and school to refer to all of the public and private schools that impart different stages of primary and secondary education in Catalonia.

- Identifying how the network is being used in educational processes both within and as well as outside the classroom.
- Determining in what way ICTs are incorporated in the teaching practice and what forms of use can be distinguished
- Establishing the type of knowledge and level of mastery that the directors, teachers and students have in relation to the use of ICTs and Internet
- Specifying the level of knowledge and training that the teaching staff has with regards to the use of the Internet for educational purposes.
- Defining the main obstacles and facilitating aspects of the incorporation of ICTs for educational purposes.
- Showing the perception and expectations of the directors, teachers and students concerning the process of incorporation of the ICTs in educational activities.
- Placing the incorporation of the ICTs among the priorities of the institutions' directors.
- Determining the degree of integration of the ICTs in the various aspects of the organisation and management.
- Identifying support that the institutions can count upon to encourage this process of incorporation.
- Identifying what factors can be strongly associated with the frequency and way in which faculty use the Internet in their teaching practices.
- Analysing the degree of penetration of the Web as a collaborative and participatory tool of the educational community within the framework of their schools.
- Determining the role of the Internet in the creation and promotion of networks for collaboration and participation beyond the boundaries of the schools.
- Studying the role of the school as a way of balancing present and future inequalities in information technology in school-age children and teenagers.
- Establishing the basic topology of network uses for students outside of the school site.

The research project sets out also to identify which aspects should be modified and which innovations will be needed for an optimal integration of the ICTs into the service of the educational needs and requirements of the network society.

1.2. Work and frames of reference hypothesis

The analysis developed in this research paper starts from the idea that the Internet is not the causal factor of innovation and the new ways of organising educational practices in the network society, but it is probably a necessary instrument for the transformations that school education should embark upon in order to adapt to societal requirements. From this perspective, we do not ask ourselves what is the impact that technology has or stops having in a certain area of learning activity or in the practices that students and teachers carry out. Instead, our interest is directed at discovering how these actors incorporate the Internet, for what purposes and how the interaction between these purposes and uses of the Web identified in the specific context of schools and institutes generate, or not generate, new scenarios, new practices and new distinctions or inequalities in educational processes.

Taking into account that the specific studies on the use of the Internet in schools with a focus and methodology like our own are still scarce, in order to build our theoretical analysis framework, we have taken as references, on the one hand, the studies that deal with the processes of incorporation of ICT in educational practices, focusing primarily on the use of computers in the processes of teaching and learning (Scardamalia, Bereiter and Lamon, 1994; Ringstaff, Yocam and Marsh, 1996; Pea, 1996; Coll 1996, 2001; Salomon and Almog 1998; Jonassen, Peck and Wilson, 1999; Becker and Ravitz, 1999; Riel and Becker 2000; Niederhauser and Stoddart 2001). On the other hand, we have observed in the research that the role of the ICTs has been analysed in the processes of innovation of the school education (Kerr, 1991; Papert, 1993; Ertmer *et al*., 1999; Cuban 2001, Cuban, Kirkpatrick and Peck 2001; Zhao and Frank, 2003; Hernández-Ramos, 2005; Judson, 2006) as well as the studies that in a broad way have tackled the innovation processes and educational reforms that affect the essential parts of the structures of the educational system (Fullan, 1991, 2002; Marchesi and Martín 1998; Hargreaves, 2003, among others)

In order to characterise the demands that the educational systems receive in the emerging context of the informational society, we have mainly used a number of market studies, working documents and statements issued by international organisations and governments on the policies of e-learning.

An examination of literature examining the use of ICTs in the teaching and learning processes shows the existence of a great variety of conceptual frameworks that deal with this question (Aviram and Tami, 2004; Carnoy, 2004; Coll, 2003; Twining, 2002). These frameworks, in accordance with Twining (2002), reflect the tension between those that believe that ICTs must help teachers better develop their educational ideas and those that see ICTs as one of the primary driving agents of educational change.

From our perspective, we are interested in understanding the relationship between the uses of ICTs, and basically the Internet, and the changes that occur in educational practices, while understanding in this case, as Coll (2003) suggests, that the key is not in technology, nor in pedagogy, but in the pedagogical use of technology.

The data on which this study is based have been obtained by selecting a group of relevant variables, from our point of view, which refer to key elements in the practices that make up classroom education in today's society. These elements have been defined through the complex integration of views and frameworks of different analyses, depending on the area that we are dealing with.

When we begin to identify the possible uses of the Internet in the different activity levels of the educational institutions, we use criteria like those proposed by Twining (2002), who stresses the importance of the quantity and quality of the time that is dedicated to the use of the ICTs in the classrooms as a fraction of the total time dedicated to learning. The underlying objectives to this use include ICTs as a learning goal, as a tool for developing knowledge in other areas of the curriculum, as a tool for increasing innovation in the educational practices or for promoting independent learning by the students and for motivating them to learn, and finally, the impact that ICT use has on the curriculum, although this last aspect has not been specifically dealt with in this study. In addition, we rely on the authors that analyze the different uses of the ICTs according to how well they adapt to the conceptions or types of teaching practices, inspired by transmissive or constructivist models of teaching and classroom learning (Riel and Becker 2000; Coll, 2001; Cognition and Technology Group at Vanderbilt, 1996; Pea 1996, among others).

With reference to the new needs and challenges of educational systems in the information society and the role that the internet and ICTs can play in meeting these challenges, we have taken into account the works of Castells (1999, 2001c), the market studies of Marchesi (2000), Kennewell, Parkinson and Tanner (2000), Venezky and Davis (2002), and those that the OECD (2001) has carried out, as well as documents and publications from a number of institutions and government entities(IV EU – LAC Ministerial Forum on Information Society, 2006; Kerrey, 2000; Finnish Ministry of Education, 1999; the Dutch Ministry of Education, Culture and Science, 2000).

Finally, with regard to structural questions of the functioning of the educational centres, we have taken as a reference the research done in the last decades on the effectiveness of schools (*School Effectiveness*) starting with the work of Sammons, Hillman and Mortimore (1995), Hargreaves and Fullan (1998), Ainscow, Hopkins, Soutworth and West (2001); and on the processes of continuing improvement in the school (*School Improvement*), from the works of Hopkins (1996, 2001) and Gray *et al.* (1996).

1.3. The configuration of a new framework for education in the information society

As Coll (2003) points out, one of the features that most clearly characterizes our society today is the centralisation of education as a basis for access to knowledge. Education has become a strategic priority for economic and social development beyond the role it has traditionally played in the process of development and socialisation of new generations of citizens. This centrality of education in the new economic and social order drives the radical transformation of the educational objectives inherited from the industrial society.

On the one hand, it is the need for students to acquire skills and capabilities for learning throughout their lives, to know how to use digitally stored information and then recombine it, while generating appropriate knowledge for each planned objective (Castells 2001c), and to think independently.

On the other hand, the new paradigm of information communication and technology (Castells, 1999, 2004) has contributed to rekindling and updating arguments and demands that are the basis of educational reforms promoted over the last thirty or forty years. In this way, existing information and communication networks further question whether the transmission of knowledge is the objective priority of schools and institutions and primary function of the teaching staff. The school has to continue to provide knowledge systems for the different fields of discipline but, at the same time, it has the goal of providing the necessary skills for students to continue learning independently and effectively, beyond that of the different stages in which the educational system is structured.

In addition, universal access to education, migratory movements and a growing multi-cultural society require a basic education that responds to the needs generated by an increasingly diverse school population. The ICTs and especially the Internet open the possibility of bringing education to a great variety of real and virtual scenarios, implying new agents in the educational processes. The evolution towards a social educational environment, in contrast with the model of the school in the industrial society based on homogeneity and isolation with respect to the community, provokes a greater opening of the school while blurring the boundaries between formal and informal education.

As a consequence of the constant pressure that is exercised on the educational system and the complexity of the tasks that the schools and educational institutions have to carry out in today's social and cultural context while taking into consideration the uncertainty of the changes that will be needed in the future, the teaching staff will increasingly have to adopt more ways of organising educational activities based on teamwork, flexibility, dialog and par-

ticipation of the entire educational community. The educational centres will need faculties inclined towards innovation, working through networks and continuing professional training.

All these factors have been considered in our research as we put into context and characterise the different uses of the Internet on the part of administrators, students and teachers and in the process of analysing and interpreting the data we obtained.

1.4. The realisation of the project

This research project is based on information obtained from a questionnaire survey, done through in-person interviews from a sample of 350 educational institutions (junior and senior schools), representative of all of the institutions in Catalonia that provide primary education, *educación secundaria obligatoria* (ESO) (compulsory secondary education), *bachillerato* (roughly the lower and upper sixth in the U.K.) and *ciclos formativos de grado medio* (CF-GM) (middle degree professional training), according to the methodology detailed in the section following this report.

The survey in each institution was carried out through:

- A questionnaire for the administrators of the institution, which included: an interview with the director, an interview with the head of studies or the pedagogical coordinator or the supervising teacher of the stage selected (depending on the characteristics and organising structure of each educational institution), an interview with the supervisor of the ICTs in the institution (if there was one) and a file with basic information on the school.
- A questionnaire for the teachers, given through interviews with all of the teachers that teach in the selected group-class (approximately 6 teachers per group on average)
- A questionnaire given collectively to each of the students of the selected group-class (an average of approximately 19 per group). In primary schools to students in the second course of the third cycle (11-12 years); in the compulsory secondary, students in the second course of the second cycle (15-16 years); and in the *Bachillerato* and middle grade professional training, students in the last course (18 years and older).

This research project was initiated in July 2002. The design phase of the project, drafting of the questionnaires and creation of the sample ended in November 2002. The field work was carried out between December 2002 and April 2003. The database was built during April and May of 2003 and the first research report was published in March 2004. In September 2004, the second phase of the project was started with new, more complete and extensive

analysis intended to go deeper into the results presented in the first report. The project ended in 2007 with the publication of the final research report which we describe in this summary.

The survey involved creating 350 central files and 9,876 questionnaires.

2. Research Methodology

This research project is based, as we have mentioned above, on the administration of a group of questionnaires done through personal interviews, to a representative sample of educational institutions (primary and secondary schools) in Catalonia. The universe of our study is, therefore, the group of students, teachers and administrative teams of the 2,726 institutions that, according to data provided by the Generalitat of Catalunya[2] for the 2002–2003 school year, taught classes in primary education, compulsory secondary education, *bachillerato* and medium degree professional education in Catalonia. Accepting overall margins of error of around ±5% at the institution level, with a 95.5% degree of confidence and the assumption of maximum uncertainty, we set a sampling size of 350 institutions. Taking into consideration that we are interested in examining the specific behaviour of the different educational stages involved in non-university education more than the educational institutions in general, our study takes into account all of them instead of complete institutions.

To do this, while assigning a proportional distribution with respect to the stage taught, the geographical area, the size of the population and the title of the institution, we selected 350 of the existing 4,215 existing stages in the first stage of the sample stratified by conglomerates. In practice, given the possible coexistence of stages in the same institution, the sample of participating stages corresponds to 335 different educational institutions.[3] Likewise, to construct the sample for the students and teachers, we randomly selected a group-class from the last course of the stage while interviewing all of the students and teachers that taught in it. Furthermore, a dossier from the institution allowed us to collect additional information at the school level.

With the aim of maximising the effectiveness of the field work, a pilot test was carried out in November 2002. After appropriate modifications in the process of administering and collecting the information, the field work was carried out between December 2002 and April 2003. A team of interviewers formed for the occasion travelled in person to the institutions which, after having agreed to participate in the study, facilitated our access to the groups involved. In all of the cases, the questionnaire was administered individually by the interviewer in a personal interview. In the case of the students, when dealing with an entire group-class, a formula was opted for in administering the survey in a group during the classroom hour under the supervision of the interviewers and in the presence of the teacher for the group-class.

2. Autonomous Government of Catalonia
3. Of all the participating schools, due to the random selection of stages, only 15 institutions brought two educational stages to the our study at the same time. In all cases they were treated as different schools.

At the end of the field work, after the coding and recording of the questionnaire as well as the later cleaning up of the database as needed, our research resulted in a total of 9,825 participants: 6,612 students (see table A.1), 2,164 teachers (see table A.2) and 1,050 administrators[4] (see table A.3). These sample sizes, in accordance with the populations that they represent, allowed us to establish margins of error of ±5.1% for statements at the institutional and administrative team level, ±2.1% for the faculty, and 1.2% for the students.

Table A.1. Sample size of the students

Primary (6th course: 11-13 years)	2,918
Compulsory secondary (4th course ESO: 14-16 years)	1,883
Bachillerato (2nd course: 18-20 years)	1,269
Training cycles (to be determined: 16 years and older)	542
Total	**6,612**

Table A.2. Sample size of the teachers

Primary (6th course):	785
Compulsory secondary (4th course ESO):	673
Bachillerato (2nd course):	533
Training cycles (to be determined):	172
Total	**2,163**

Table A.3. Sample size of the administrative teams

Primary	175 x 3 = 525
Compulsory Secondary	82 x 3 = 246
Bachillerato	59 x 3 = 177
Training Cycles	34 x 3 = 102
Total	**1,050**

The analytical strategy, from which we have started creating a series of scientific reports and publications, is composed of two clearly distinct phases, culminating with the publication of this report. Thus, the first phase of our project (2003–2004) focuses on an analysis of the

4. Of the 350 institutions selected, we used information obtained from three types of managers involved: the director, the stage supervisor and the ICT supervisor.

large numbers with respect to the introduction of Internet into the non-university educational system of Catalonia. As a result of this work, along with the first descriptive results, we are starting to put forth initial hypotheses of a bivariable nature particularly from the stratification of variables.

Next, in the second analytical phase (2004–2007), our objective was to adopt a inferential strategy, trying to go beyond the data collected at the time of transition, with the objective of establishing the respective underlying relationships and processes. In this sense, the analytical strategy started progressively evolving from description towards explanation, where new work hypotheses have started to be created towards a multivariable approach of the phenomenon being analysed, which allows us, with the appropriate statistical controls, to maximise the explained variance.

Therefore, the empirical results on which this report is formulated belong to this double natured analysis: knowing the “what” and trying to offer some explanations about the “why”. Both strategies have been altered depending on the advisability of tackling with precision the different objective subjects of the study. The interested reader can find the group of tables that support the discussion, the details relative to analysis plans and the coding of the variables in the appendices of the report.

3. Summary of the main results and conclusions

We next introduce a summary of the main results obtained and analysed in the different chapters that make up the complete report in its original version. Two distinct types of results emerge from the processes of analysis performed. On the one hand, we have a group of data available that allows us to observe in detail a kind of photograph of the situation in which the process of introducing the Internet in the Catalonian classroom in Catalonia was found at the moment in time when the field work was carried out. This photograph, static by nature, gives us an image of what was happening in the schools and institutions during a time of change. The speed with which the use of the Internet has continued to expand and diversify requires us to read and interpret the data in the context and in the moment in which it was collected. This data, if collected today, would certainly be different.

But this is not, from our point of view, the main contribution of this research. Our work, beyond the description of the state in which the incorporation of the Internet is found at a particular time, has been concentrated on the analysis of the relationships between the different factors that characterise the presence of the Internet in the educational institutions and the use of the Web by part of the agents that make up the educational community. In this sense, our main objective has been that of identifying trends and patterns of conduct that give us a better understanding of the complex processes of educational integration of the Internet and directs us to more clues about how to approach it, both from the point of view of the policies and actions to carry out from an applied perspective, as well as continuing to advance the educational research in this field. We believe that this second type of results turn out to be fully applicable and allows comparison with many other research works that, in different fields and various geographic areas, are concerned with the evolution of processes of integration of ICTs in education.

3.1. Main results

3.1.1. The use of the Internet in educational institutions: a general perspective

We must first of all emphasize that the teachers and the students of the educational institutions of Catalonia utilize and access the Internet in their daily life with much more frequency and greater familiarity than the average of the overall population of Catalonia (90.6% of the teachers and 72.5% of the students have a computer connected to the Internet in their house and use it with certain frequency). Secondly, practically all of the teachers seem to know how to use e-mail and Internet search engines and a large majority know how to send files, download applications from the Web or participate in a chat. Around 20% of the teachers have, in addition, advanced skills in the use of the Internet, such as the ability to edit or modify web pages.

Likewise, we have also found that teachers and students, for the most part, show interest in the Internet and consider it a very important tool in the future of education. In this sense, close to three quarters of the teachers believe that the Web is important or very important for education and are interested in using it in their teaching practices. Despite this, in reference to the use of the Internet, the reality of the educational institutions is very far from what these preliminary data might make us think.

3.1.2. Use of the Internet in the classroom

The frequency or proportion of lesson hours in which the teacher and the students of the educational institutions use the Internet for educational purposes is frankly quite low. With reference to students, we should emphasize that 37% of the total, at the time we collected the data, still had never used the Internet during classroom hours. If to this significant percentage we add the students that use it less than once a month, we have 60% of the school population of Catalonia not using the Web in a relevant way in their school. Those that use the Internet in a significant way (once a week at a minimum) do not amount to a third of the total student population.

This low level of use on the part of the students is considered as a consequence of the infrequent use of this technology on the part of the teachers. Of the teachers that were teaching the group-classes selected for the study, 71.2% never used the Internet with the students of these groups. Only 15% of the teaching staff uses Internet in their classes fortnightly or more. The average number of monthly hours that teachers use the Web in their classes was 0.88 (2.02 hours, if the use of computers without Internet connection are included)

The reasons why the Internet is so little used in teaching and learning are various in nature. On the whole they are not exclusive to our environment and affect, to a lesser or greater degree, most of the educational systems of the nations of the developed world. Nevertheless, there are some causes that appear to affect the institutions of Catalonia in particular. We refer especially to the place where the computers connected to the Internet are usually located. As opposed to other countries, in Catalonia, with a ratio of student per computer connected to the Internet slightly higher than the European average,[5] only 3.7% of the students expressed that they could access the Web from their classrooms. The remainder, that is practically the total, either did not access the Internet or did so from special Computer classrooms.[6] This way of organising access in itself drastically limits the frequency of access

5. The primary and secondary educational institutions in Catalonia showed, in the 2000-2003 period, an average of 11.3 students per computer, compared to 13.2 of the total EU according to data from 2001-02. If the number of computers connected to the Internet is taken as a reference, the ratio was 21 students in Catalonia and 32.9 for all of the EU.
6. These are classrooms where the different group-classes go to in turns to use the computers depending on their availability.

to the internet. Other causes put forward by the directors and the teachers are the lack of technological resources, the lack of training and, in particular, the lack of time for preparing teaching and learning activities that include the use of ICTs.

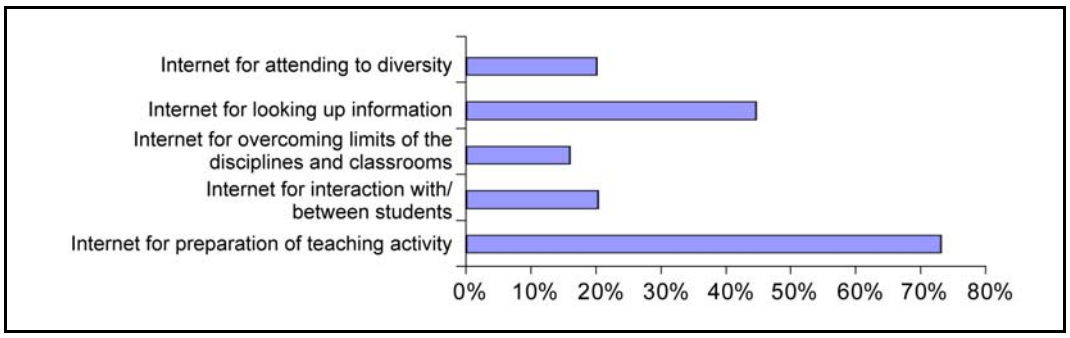
As to the end uses for which they are used, Internet and ICTs are, first of all, their own study objective: At the time they were interviewed, 63.7% of the students were taking computer classes and 67.4% of them were learning to use the Internet. These kinds of classes were common especially in primary school where these percentages were 84% and 73.9%, respectively.

The use of the Web as a means of accessing curricular activities of various subjects takes second place: three-quarters of the students that use the Internet in their classes did so to look up information for class related content. This type of use, in addition, is carried out in study activities and in the school tasks that the students do outside of the institution (71.2% of the students have used the Web at least once while doing these activities). But this apparently extensive use is of a decidedly sporadic character, especially during school hours. Their incidence in the whole of the curriculum is practically irrelevant given that seven in ten teachers never use these technologies with their students whether to access content of the subjects or for any other purpose.

Less common still is the use of the Internet for doing innovative activities in the teaching and learning process. The percentage of teachers that take advantage of the potential of the Internet for collaborative work among students, to participate in interdisciplinary projects or to tend to the diversity of the educational needs of their students barely reaches 10% of the population.

As we have said, the frequency and the way in which the students use the Internet in the classrooms depend entirely on the frequency and the way in which the teachers integrate technologies into their teaching practices. With regard to the Internet, three-quarters of the primary and secondary teachers use the Web to prepare their classes, but less than half of these teachers end up using the Internet in the classroom with their students. Teachers primarily use the Web in their classes to look up information on their teaching subject. Beyond this use, which is relatively extensive among those who have used the Internet in their classrooms, less than one-fourth of the teachers use it to encourage greater interaction with their students or to push for collaborative work among them. A similar proportion of teachers use it for tending to the diverse needs of their students. The use of the Web for participation in interdisciplinary projects, or for collaboration with students in other classrooms or other institutions, does not exceed 15% of the total of the teachers incorporating the Internet in their teaching activities.

Figure 1. Uses of the Internet in teaching practices (% of all teachers that have used the Internet in their teaching activities)



The use of the Internet for class preparation and for looking up information related to their subject area is unquestionably the predominate practice in the educational institutions of Catalonia. These practices are characterised by the predominance of a transmissive-receptive pattern, under strong control by the teachers, which leave little room for active student participation and decision making about their own learning process. In keeping with the dominant teaching patterns, the ways of using the Internet that seem most inconvenient to this type of practice are those that clearly have the least presence in the classroom.

In all of the aspects analysed, we have found differences that could be associated with demographic type variables (age, gender, geographic location), with different educational stages (primary, compulsory secondary, *bachillerato*, professional), or the institutions' status as public or private. But none of them resulted in being sufficiently significant to be taken into account in this summary of the results.

3.1.3. The institutions' promotion of the Internet for educational purposes

The introduction of the Internet and ICTs in the main activity areas of the educational institutions assume, without a doubt, a considerable effort of innovation in which the teachers are the main actors. But in order to bring this process together, the leadership and encouragement of the administration of the educational institutions are needed. As to professional uses of the Web by the administration of the educational institutions, at the time the field work was done, three out of four of these administrators used the Internet for management tasks and carrying our their responsibilities. The presence of the ICTs in the automation of some of the academic-administrative processes and in the relationships of data exchange with educational administrations and other institutions and educational services are fully established.

But if we examine up to what point the integration of the Internet and ICTs into the teaching and learning processes is being promoted, we see a very different picture. First of all, the

incorporation of the ICTs for educational purposes is not a priority for most of the directors of the institutions of Catalonia. Considering that the ICTs do not represent an end unto themselves, up to a point, it is understandable that they do not appear among the priorities of the educational institutions. What is notable, in all cases, is the great variety and dispersion of the priorities shown by the school directors. This dispersion makes it practically impossible to identify which questions are really important for the directors and for the pedagogical supervisors of the institutions (heads of studies, stage supervisors or pedagogical coordinators) and which are their priorities in the processes of educational improvement.

Despite not being a priority, many institutions have promoted training programmes for their teaching staff related to Internet use and ICTs. But the training that is carried out in this area is mostly of a documental character. The training for educational use of these technologies has less presence among the activities promoted by the directors and even less is the presence of training oriented to the innovative use of ICTs in the processes of teaching and learning.

Nevertheless, the most remarkable of our findings in this area is that when the incorporation of the Internet is a priority for the directors of an educational institution, this priority does not appear to incite either more frequency in the use of the Web or a more varied use of these technologies by the teaching staff. This lack of connection is observed both in the public as well as the private institutions despite the different ways in which the administration can practice in the two types of institutions. The leadership problems in the processes of integration of the ICTs in schools show us a broader host of problems that go beyond the objectives of our research. But, in any case, these difficulties of leadership constitute a very serious obstacle for greater integration of ICTs into educational practices for schools.

3.1.4. The teaching staff, the key element in the incorporation of the Internet in the teaching and learning processes

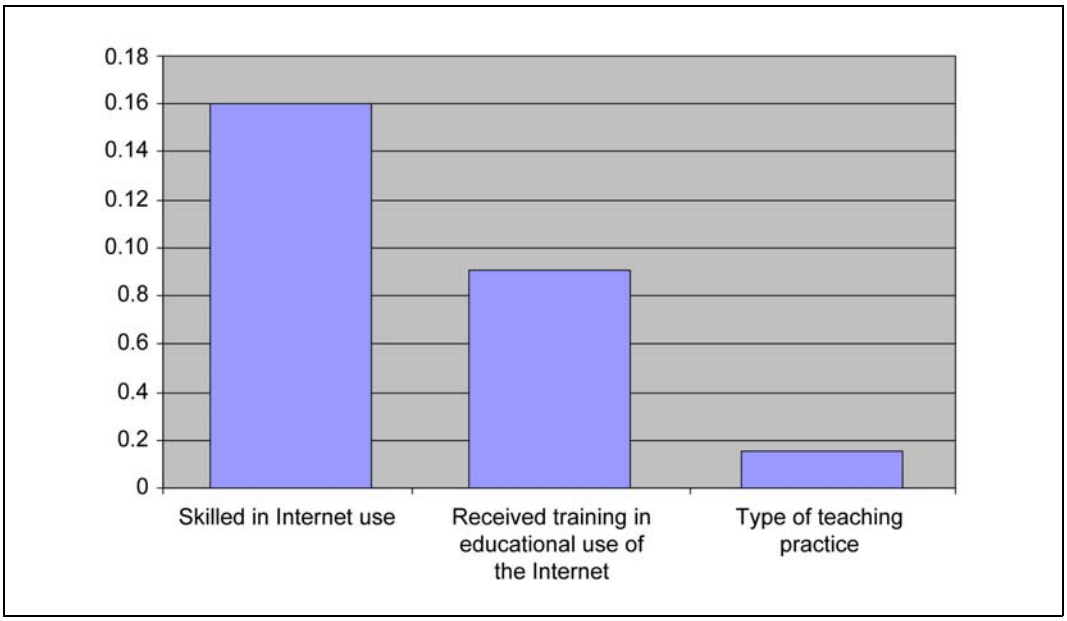
In our study, the fundamental role of the teaching staff has been demonstrated [7] when it comes time to decide the way and frequency with which the Internet is used in the teaching and learning processes. The attitudes, beliefs and perceptions that the teachers have towards the educational use of the Internet and ICTs and the type of teaching practices that they adopt, appear to have more influence than the technological resources available at the institution and the actions that come from the surrounding environment.[8]

7. In agreement with Cuban (2001), what we mean is that the teachers act with greater autonomy in their classrooms, based on the amount of leeway that they have. For this reason, we agree with the statement of this author in the sense that "explaining teachers' individual and collective behaviour in the use or non-use of technological innovations must go beyond popular explanations that tend to blame teachers for what they are and what they do. The alternative explanations consider personal choices and the satisfaction of the teachers in interaction with organizational, political and social contexts in which they carry out their work".

It also important for us to emphasise that the degree of influence that each of the factors has over the use of the Internet by the teaching staff varies according to whether we look at the frequency with which these teachers use the Web in their classes or whether we are referring to the way in which they use it in the entirety of their teaching activities. Likewise, it appears that, in each of these variables, capability is different depending on the type of use that we observe.

As to the frequency or quantity of use in the classroom, the factors that show greater ability to influence are: having proven advanced mastery of the skills needed to use it, having received training related to the educational use of the Web and having the perception that the Internet is important for education. The accumulated presence of these factors in the same teacher will be of even greater advantage in a more intensive use of these technologies in the classrooms. However, it does not seem that the type of teaching practices that the teaching staff adopts has much influence on the quantity of time dedicated to the use of the Internet in their classes.

Figure 2. Influence of skills, training received in the educational use of the Internet and type of teaching practices in the frequency of use of the Internet in the classroom
(Weighted factors in multiple regression)



On the other hand, the characteristics of teaching practices without ICTs that teachers carry out will have a significant influence on the way in which they use the Internet, especially when it is used in an innovative way.

8. We refer to, among others, specific plans promoted by administrations and supervisors of the institutions, to the support they receive and the various facilities and building related to the type of school where they work.

Thus, while factors that demonstrate a greater influence on the frequency of use with which teachers use the Internet in classrooms maintains its preponderance in uses of the Web to prepare classes or search for information related to their teaching subjects, in uses destined to promote interaction of the teaching staff with students and among students and the use of the Internet for attending to the diversity of educational needs, a greater balance is now detected between the weight of the advanced skills in the use of the Internet and the type of teaching practices acquired claimed by the teaching staff.

Figure 3. Influence of skills and the type of teaching practice on the use of the Internet for interaction with and among students (Increase in the probability)

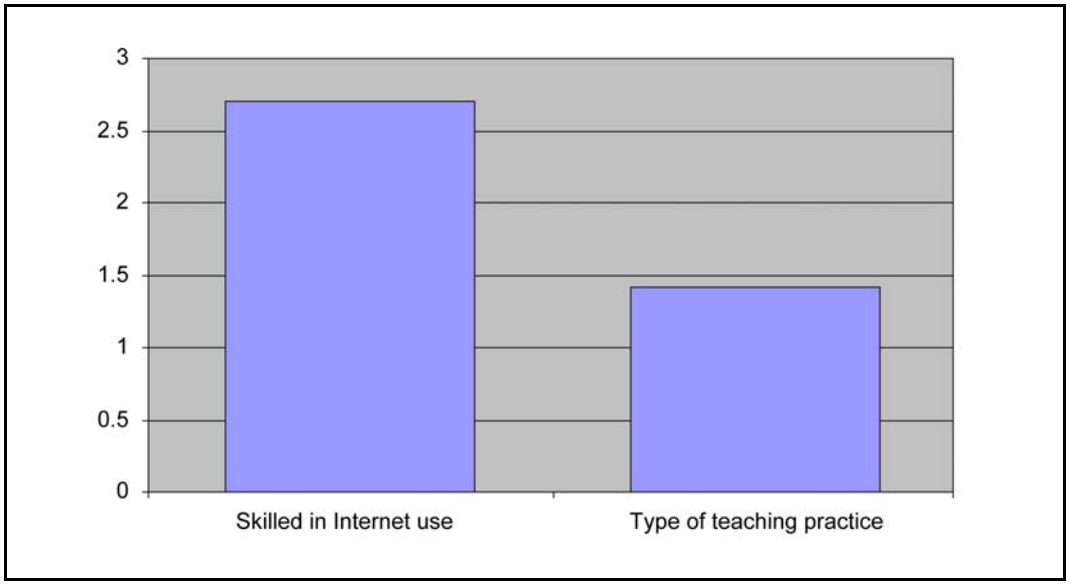
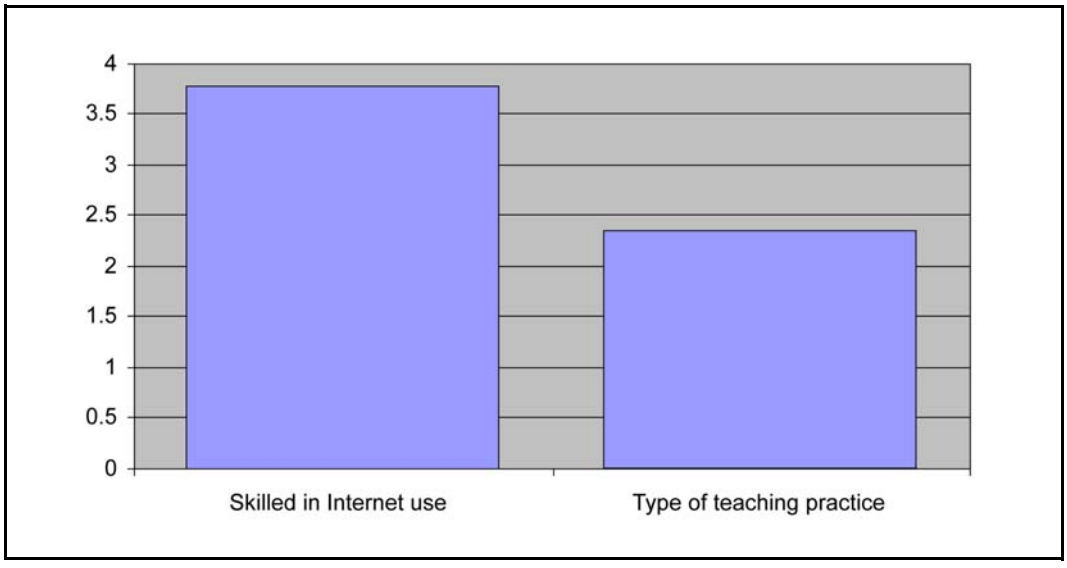
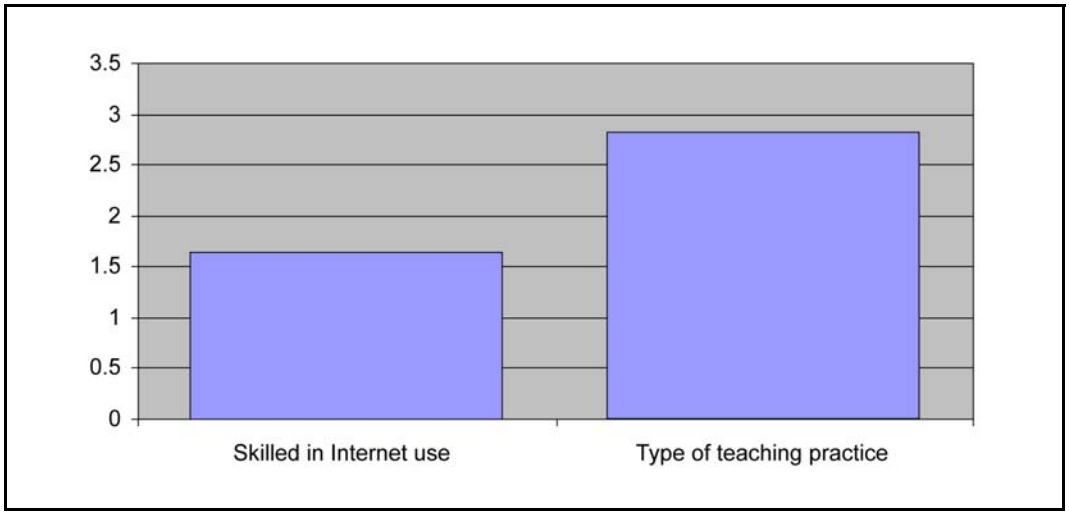


Figure 4. Influence of skills and the type of teaching practice on the use of the Internet for attending to diversity (Increase in the probability)



There are uses of the Web that we could consider more innovative compared to traditional educational practices. In the incorporation of these uses for participation in projects that involve going beyond the limits of the disciplines and the structures of classroom participation and work, it is the teachers who assume a type of teaching practice compatible with a constructivist conception[9] of teaching and learning, which presents a greater probability of using the Internet. It seems then, that to use the Internet in the classroom in a varied way, while at the same time taking advantage of its maximum educational potential (which is so important for appropriate technical preparation and a positive perception of the relevance that the Internet has for education), it is revealed that the teaching staff should adopt a kind of practice that distances itself from traditional or transmissive-receptive conceptions of teaching and learning.

Figure 5. Influence of skills and types of teaching practice on the use of the Internet for participation in projects that exceed the boundaries of classroom work (Increase in the probability)



Lastly, we have to stress, with certain surprise, the minimal influence that the availability of technological and pedagogical support in Catalan schools has on the frequency and manner in which the teaching staff use the Internet in the classroom. The little impact of this type of support is perhaps related to the small amount of penetration that ICTs have in most classrooms and the fact that the ICT managers in the educational institutions, at the time we collected the data, were still dedicating a significant amount of their time to just teaching students how to use the Internet.

9. We are referring to this type of conception in the broadest sense.

3.1.5. Academic performance, influence of the family environment and Internet use on students outside of the classroom

Although the focus of our attention is directed primarily at the way in which the Web is incorporated into the activities of the educational institutions, we understand that this process is not independent from how young people and children are using ICTs in other areas of their daily life. The process of integration of the Internet in the educational institutions should not be looked at as a phenomenon detached from the way in which young people use the Internet when they are not at school, from how it is integrated into their homes, or from how their families use it.

With this in mind, we have attempted to demonstrate the relationship that is established between the students' academic performance and their use of the Internet when they are outside of the school context. We consider this process from an alternative viewpoint from the one that claims to find in this use of the Web the effect of unleashing improvements in the academic results of the students. We specifically focus on the way in which the performance or the use of the Web by parents ends up encouraging an approach to the Internet by these same students. We will explain, from this point of view, how the Web is not used in a homogeneous way by young people when they are not in school and we emphasise some of the factors that encourage this distinction.

Connection possibilities

Before stopping to look at how the ways in which the Internet is used will determine young people's potential access to it, we cannot ignore, from the start, the strictly technological conditions that make the Web available to them. At the time that we did this study, most of the students already had access to a computer in their home that had an Internet connection. But beyond availability, when we observe the real possibilities or use, we had to admit that the situation was very favourable. When we add to those that do not have connection from the home (37.5%), those that cannot use it or can only used it on a restricted basis (21.7%), we have to say that those who have more favourable access conditions (40,8%) are still not a majority.

In any case, it seems that in our immediate context, the digital dividing line derives increasingly less from the availability of hardware and essential connections. We cannot consider the phenomenon of digital exclusion only as the result of not being able to connect. The inequalities are also a result of effective access to the potential of the Web for educational purposes and this ability depends on a broader and more complex group of factors that are not only technological, but are related to the ways in which young people make use of the Web.

With this in mind, we focus attention on the frequency and way in which children and young people use the Internet when they are outside of the educational institution.

Frequency of Internet use outside of the school

Outside the boundaries of the school, not all young people use the Internet with the same frequency. The distribution among the biggest users and those who hardly use it at all is still very balanced. Those that use it the most and those who use relatively little (34%), or even do not use it all (17.5%), are distributed almost equally. In fact, this group of non-users is even slightly larger: more than half the students (51.5 %) are connected monthly, at the most. Those that access it daily are not much more than one-quarter (27%).

Thus, those that do not access it in any case are a minority. The main reason they put forward is not a lack of interest or that they do not know how to use it, rather the obstacle they find is precisely in not having the essential connection available. Consequently, as the possibilities of having access seems to be becoming universal, the use of the Web should be increasingly omnipresent in the daily lives of young people. The data shows us, however, that the process that we analyse is not followed in the same way, or in the same intensity, by the group of young people.

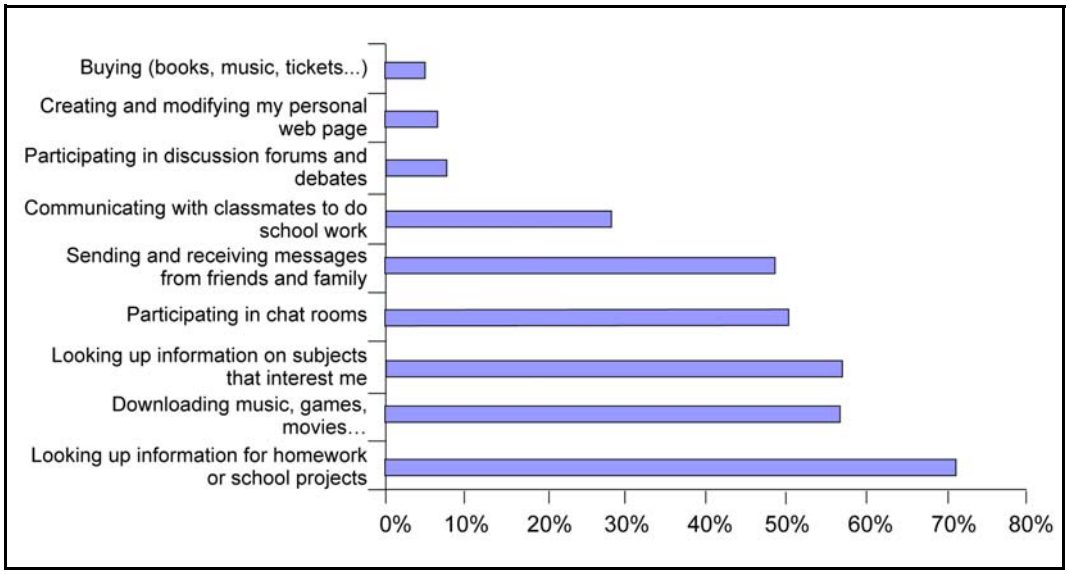
Type of Internet use outside of the school

Beyond the frequency of Internet use, we have paid attention to the way in which the students use it when they are not at school. Because we are aware of the potential that the Web offers to each student and the inequality of opportunities in this area, the way in which it is used and to what ends individual use are directed need to be researched. From this perspective, we have distinguished the uses directly linked to school activity, such as looking up information or communication with classmates for solving homework problems, from other forms of use not directly related to school activity.

Observing the whole of the students, without distinguishing by age, we see that a majority (71.3%) use the Web for solving school related assignments and also, although in lesser proportion (56.6%), for other types of activities more related to leisure time and communication with other people. At this second level, more than half of the students say that they access the Internet for downloading music, games and movies (56.6%) or for finding information on subjects that interest them (56.4%). Finally, among this second group of options, we have also been able to identify a majority of use of the Web for participating in chat rooms (52%) and for the sending and receiving of messages (49.7%). This last type of op-

tion is located at a certain distance from what we can still consider less important forms of communication related to work on the Web such as communication with classmates for doing work or participating in discussion and debate forums (26.3%), putting information on the Web (5.3%) or for marketing type purposes (3.9%).

Figure 6. Ways students use the Internet outside of the institution



We have stated that parents' proximity to technology, or their academic performance, can be associated with different ways of using ICTs by young people. But, before pausing before these questions, we can observe that the heterogeneity in the use of the Internet by all young people can now be detected in the way in which variables like gender, socio-cultural position and age of the students have an effect.

The influence of academic performance and family context

With a multivariable analysis we can first of all state that the age of the students, independent of the rest of the variables, maintains a direct relationship with availability of access to the Web, but also the different ways in which boys and girls use it. Every additional year in age brings with it a significant increase (22.7%) in the number of young people that have access from the home. In this annual increase, we can also detect, on the one hand, the increase (5.3%) in boys and girls that make use of the Web for actions related to their free time. On the other hand, with this increase in age, the number of students even more clearly increases (12%) who, when not at school, use the Internet to work on school activities.

The gender of the students also can be associated with a different approach to the Web. Boys use the Web significantly less (39.6% less) to do information searches or for work re-

lated to school activities. The difference in the forms of use is much more relevant when we refer to leisure uses. Boy access the Internet significantly more than girls (with 97% more probability) to spend time on activities related to leisure.

When we focus on the effects of the socio-cultural context[10] of the students, we see how, separate from the effect from the rest of the variables analysed, no important differences are observed between the Catalan-speaking, Spanish-speaking or bilingual students with regard to the availability of access to the Web from the home. A significantly less probability (38.3% less), however, is detected between immigrant boys and girls in the availability of connection from the home.

Comparing the effects of the these socio-cultural factors on the specific ways that the Web is used, we can see how the students located in a less advantageous position use the Web for school related purposes at a much lower probability (16.6% less). On the other hand, in uses related to leisure aspects, its probability of access is significantly higher in comparison with the rest.

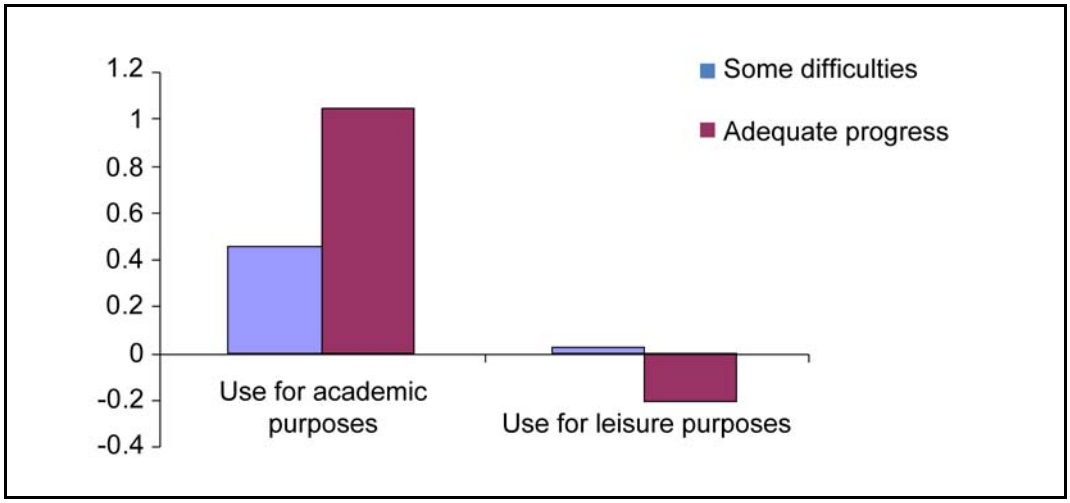
The multivariable analysis also allows us to identify the relationship between academic performance and use of the Web: apart from the effects on the rest of the variables (age, gender, language spoken at home, connection availability in the house and Internet use by the parents) boys and girls with better academic performance access the Web significantly more often (some 36% more) than those that have more difficulties. With regard to the latter, those that are located in a position of intermediate performance maintain and, in fact, even significantly increase, their probability of access to the Web (50.7% more).

Beyond this relationship with the frequency of use of the Web, when we look at the usual ways of using it, we see that the students that find themselves with some difficulty for advancing academically use the Web significantly more than those that have more difficulty (with 45.2% more probability) for the specific purpose of obtaining useful information for doing homework and solving school work activities. When we do this same comparison for the case of the boys and girls that advance adequately in their academic career, we find a linear increase in the difference: this scholastic use of the Web doubles (1.041 times more) that of the boys and girls with worse academic performance for the same purpose. The difference in the approach of one or the other to the Web, in this sense, is confirmed.

10.We can analyse this relationship from the indicator that provides us with the language spoken in the home. In our context, linguistic use forms a good indicator of the socio-cultural situation. The very same Project Internet Catalonia, in another of its lines of analysis (Castells *et al.,* 2003, pp. 187-195) has shown that Catalan-speakers tend to be situated in a better position both in terms of income as well as education. The use of language, in this sense, is more related "to socio-political and cultural issues than with ones of linguistic competence".

This situation of inequality in the way the Internet is used that occurs between the students that find themselves in different academic positions is also revealed when we turn our attention to the use of the Internet for recreational activities or, in a broader sense, for matters related to leisure: downloading music or movies, obtaining games and playing them,... Independently from the effect of other variables, approaching the Web for developing leisure and recreational type activities occurs significantly less in the case of those that find themselves in a better position academically. These do not connect as much (21.2% less) for leisure and entertainment. It can be said, nevertheless, that the differences in this type of use stop being significant when we compare the students that only have some performance difficulties compared to those that have more problems. Possibly, the greater use for school purposes on the part of the students that do better does not keep them from using the Web for entertainment.

Figure 7. Influence of academia performance on the use of the Internet for academic purposes and leisure (Increase in the probability)



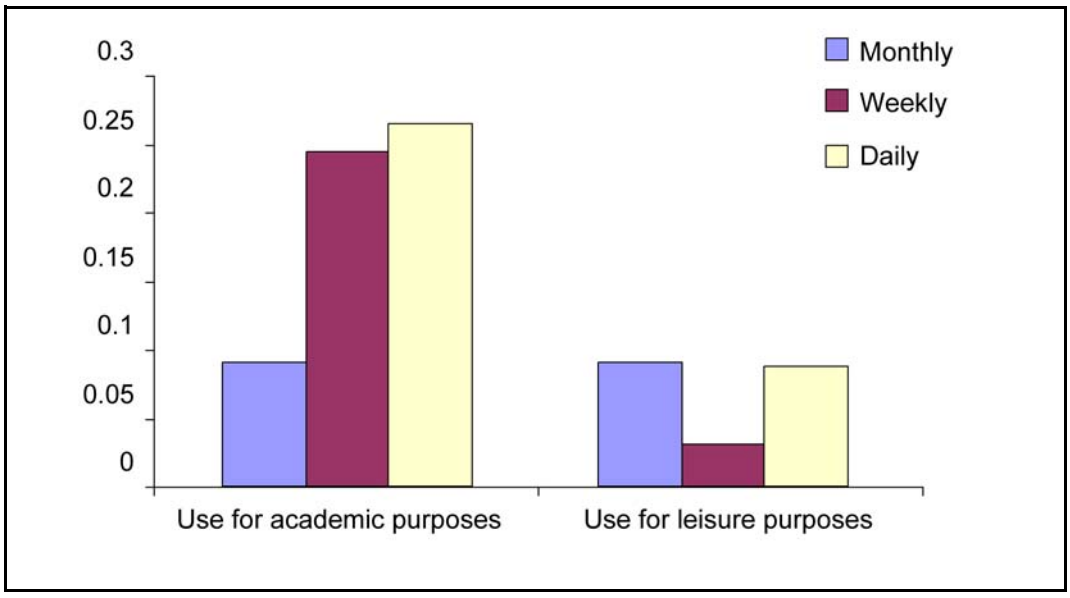
Thus, we have confirmed that the academic position of the students, independently of the effect of other variables can be linked to the different ways of approaching the Web and, in the end, to situations of inequality in the use of the Web. Facing this situation, we have also tried to see, from a multi-variable analysis, the effect that mothers and fathers can have as principal educational agents in the use that boys and girls can make of the Web when they are outside of the educational institution. To respond to this question, while understanding that a fundamental factor of influence is deduced from the use of the Web by the mothers and fathers, we have focused on the frequency with which they use it to identify their relationship with the access of the boys and girls to the Internet and the way in which they end up using it.

In the analysis it is immediately demonstrated that a greater use of the Internet by the parents is significantly related to a greater level of access for the boys and girls. The marker of this relationship remains in all cases: young peoples' degree of access increases when the

mothers and fathers are connected to the Web, whether the frequency of connection is daily (73.4% more), as well as when it is weekly (45.9% more), as well as monthly (221.8%). This relationship, on the other hand, occurs independently of the other variables that we have controlled, including availability of connection from the house or from the socio-cultural situation indicator that provides us with the language spoken in the home.

Beyond access, we are interested in being able to observe in what way this behaviour of the parents can affect the differences, which we have previously referred to, in specific uses by the young persons. It is shown in the analysis that a greater frequency of use of the Internet by the parents has a linear and significant correlation with greater use of the Web for school related purposes. The positive sign of this tendency can now be identified when the frequency of connection of the parents is lower (monthly), although, in these cases it is still not significant. But when the degree of access increases, so too does the level of access of young people for educational purposes. In comparison with the case of the parents that never access the Web, when the connection of these is weekly, boys and girls are now connected significantly more (24.9% more) for this type of purpose. This tendency, on the other hand, still tends to grow when the degree of connection of the parents increases: when their frequency of connection is daily, access to the Internet by children, for the purposes of obtaining necessary information for completing school work, continues to increase significantly (27% more).

Figure 8. Influence of the parents' frequency of Internet use for academic purposes and leisure (Increase in the probability)



So then, we can see how the relationship of the level of access by the parents in use clearly diverges from the children with respect to academic uses but disappears in its use for leisure and activities disassociated from academic ones. In this case, not even when the parents

are connected more often to the Web can the differences in young people's use be considered significant. We can verify, in this sense, how family proximity to the Web constitutes a key factor for the reduction of inequalities among young people in view of different ways of using the Internet.

3.1.6. Internet, school and community in the transition to the Network Society

In the study of the introduction of new technologies in primary and secondary education in Catalonia, we devoted a specific chapter to the analysis of its contribution to the development of social and communitarian aspects in education. To do so, we studied the community school from two complementary classical approaches in the sociology of education (for example, Dewey 1899 & 1916). On the one hand, from the point of view of its organisation, as social institutions, we analyse the degree in which use of the Web in the classroom as well as in the entire institution contributes to the establishment of internal and external networks of collaboration that control the daily activity of the schools. Furthermore, we take into account its social function, that is, paying attention to its capacity for becoming an instrument of social development to the extent that the schools are capable of promoting inclusion of new generations through its digital literacy.

With respect to the first approach, we start from the progressive consideration that the studies on Efficiency and Better Schools have shown in the last few decades the importance of social and community aspects for the development of quality education (see Purkey & Smith, 1983, and Hopkins, Ainscow & West, 1994, for a review). Aspects like the encouragement of a vision, values and common objectives, the development of a participatory leadership strategy based on the autonomy of the actors involved, the commitment and participation of the parents, the promotion of relationships with the local context and, in short, the development of a sense of ownership, have turned out to be some of the important keys for the optimal functioning of an educational system for schools. Nevertheless, treating these questions without a substantial loss of the defining elements of the very concept of community results in a complicated task (Sennett, 2001).

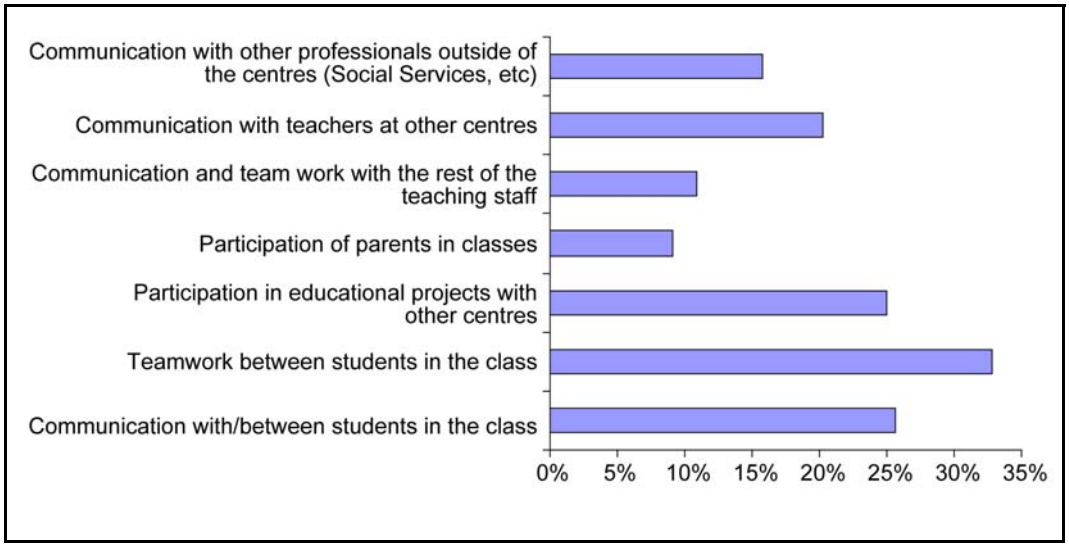
For this reason, our analytical point of departure in this approach to the school as a social organisation has been the study of the creation of a common identity –as stated by Sennett (2001, p. 71) "the pleasure of recognising ourselves and what we are"– from the analysis of the different opportunities for collaboration in the daily activity of the classrooms and institutions. To do so, we developed an exhaustive analytical model based on the theory of social capital (Putnam, 2002; Woolcock & Narajan, 2000; OECD, 2001), as the group of networks and norms for collaboration for mutual benefit, which allows us to evaluate the different opportunities for collaboration, participation and joint responsibility in daily school life.

Thus, we begin by dealing with activity not taken into account by the technology of the different actors involved, observing how the level of community development is quite different depending on the context that we analyse. If indeed there is a certain interest in these questions in the classroom environment, it seems difficult to conclude that the promotion of teamwork, participation in shared educational projects with other institutions or the opening of the classroom to participation from the different agents and collectives of the local community where the school is located, should be so far from reality.

Furthermore, the participation and teamwork indicators in schools as organisations have also shown us that there is a certain culture of collaboration, especially if we focus our attention on the ways of working developed by the teaching staff as a collective. However, although a certain complicity of internal and external collectives is expected in relation to their own involvement in the functioning of the schools, we have been able to see how differential patterns emerge of participation closer to the more traditional forms of management of the institutions.

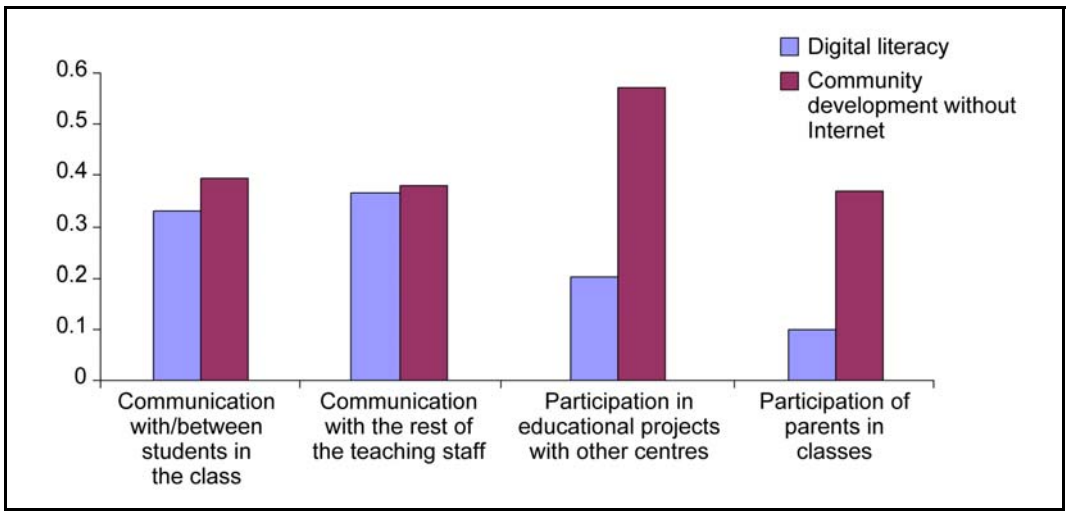
Taking this context of daily activity into account, next we focus our analysis on the specific incorporation of the Internet as a tool for collaboration. In general terms, and consistent with activity not taken into account by technology, we can also observe its lower penetration as an instrument of community creation. Nevertheless, the more we limit ourselves to verifying the continuity between both spaces of activity, the more we can focus on the specific case of the teaching staff for analysing the individual and organisational distinguishing characteristics of those that use (or don't use) the Internet for generating social capital. We end up asking ourselves, is it merely a matter of technology? Is it that the supposedly transformational capability of the ICTs simply does not work in the schools? Or is that, on the contrary, there are non-technological reasons that explain this deficit?

Figure 9. Internet use by teachers for community purposes



In this sense, two basic explanatory factors, the level of literacy of the teachers and the degree of community development in their daily activity (not taken into account by the use of the Internet), have resulted in them having a consistent and independent effect even when other variables of an organisational (like whether the institution is public or private, the size of the institution and the population where it is located) or personal (such as age, gender and stage in which they are performing their activity) nature are controlled for. In this way, our analysis shows how overcoming a minimal level of availability of the basic rudiments and skills for their use, the main question then returns to being a necessary reflection on collaboration, participation and joint responsibility as educational tools. The introduction of the Web in schools, in this sense, does not seem like a solution for the deficits of the development of a school community as would be expected by a deterministic position on the interaction between school and technology.

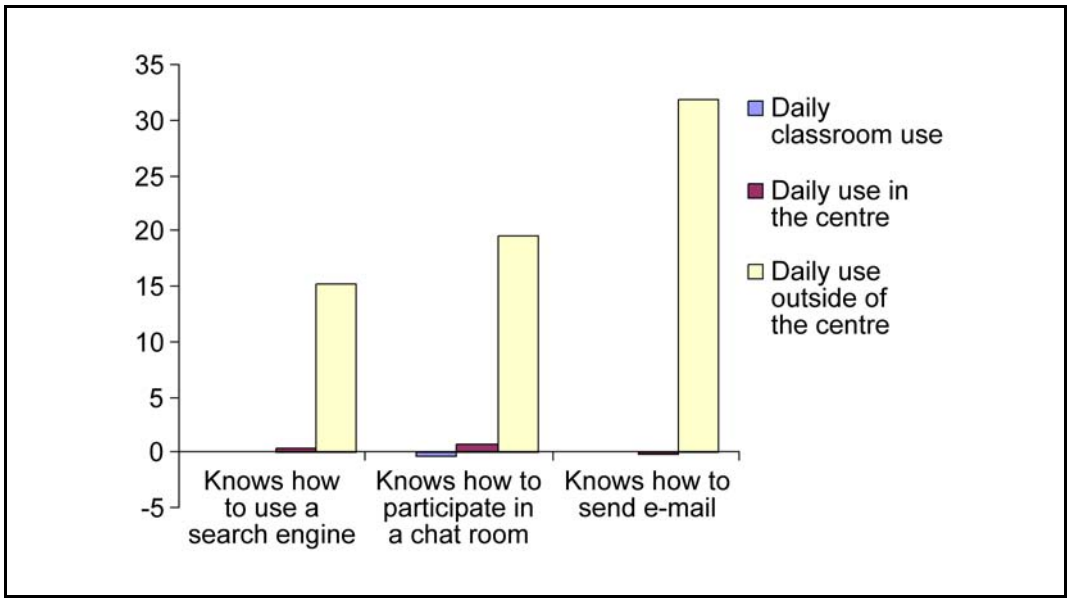
Figure 10. Influence of digital literacy and level of community development without Internet in the use of the Web for communal purposes of the teaching staff (Increase in the probability)



As we were saying above, the analysis of the capacity of the schools to generate social capital, focused on their functioning as institutions, has been carried out in conjunction with a study of their results from the point of view of their function as a tool of social development. In this sense, from a multidimensional approach to digital exclusion (Lievrouw, 2000; DiMaggio & Hargittai, 2001; van Dijk & Hacker, 2003), we have focused specifically on the evaluation of the contribution of the school in the acquisition of the basic rudiments and skills that allow for the inclusion (current and future) of the students in a progressively organised society around information networks (Castells, 2000). As we have been able to observe, a multi-dimensional approach to the phenomena of digital inequality can be very revealing for introducing new and interesting research questions around the inequality of opportunities of children and young people for acquiring the digital literacy necessary for taking advantage of the networks in which (and through which) daily life occurs in the Network Society.

Thus, besides characterising children and young people as a heterogeneous, diverse and autonomous population in relation to new technologies, our study has enabled us to explain the inequalities observed in the process of literacy of the different degrees of use of the Internet that this demographic carry out in different areas of their daily activity, including the classrooms and institutions. In this sense, we inquire about the possible role of the school as a factor that reduces this inequality, showing that it is precisely the conditions of access and use outside of the school, and not in the classroom or the institution, that play a fundamental role.

Figure 11. Influence of Internet use in the classroom, in the institution and outside of the institution on the acquisition of basic digital skills (Increase in probability)



As we have shown in our model based on practice, the activity that is being developed in the schools is not only reduced in some areas, but in addition, does not significantly contribute to the learning and acquisition of basic informational skills. At least, when we compare it with the activity that engage in on the Web outside of the school, this turns out to be the key to explaining the inequalities among students. An important debate around the role of the school in these processes remains open, especially if we conceive of the children and young people as active members of society and not only in training.

The school, in light of this both dynamic and functional approach, has some challenges with respect to the potential of ICTs from a community point of view. The school network, the one that from this point of view organises so much of its daily activity around informational networks of collaboration as it tries to prepare future generations for their inclusion (current or future), is nothing more than a metaphor right now . This is more than an ascertainable reality in light of our empirical results; however, it would be a project of change that requires a deeper

reflection than the merely technological. Beyond the deterministic promises of a possible benefit, this metaphor will allow us to reflect on the need for pushing for and developing networks of collaboration for mutual benefit in a school in transition towards the Network Society.

3.2. Conclusions

Our analysis on the process of incorporation of the Internet in educational institutions ultimately highlights the unavoidable need to stop waiting for the impact of technology on schools in order to focus attention on the ways technology is used by teachers, students and directors and in how to integrate it in their educational and teaching activities. The question on the influence of the ICTs on the dynamics of the institutions and on the pedagogical practices must be reformulated to focus attention on the different ways of incorporating the Internet in the educational practices that are carried out in schools and institutions, on their organisation and on the relationships that these institutions establish with the community.

This report demonstrates that the expectations placed on the ability of ICTs for transforming educational activity in the educational institutions of Catalonia have been poorly realised. The fragility of the work on the Web that we have been able to identity within the strict framework of the educational institutions, as well as the relationship between these and the educational community, understood in its broadest sense, reveals the low level of penetration of the Internet in this dynamic. The recurring difficulty of making the technological promise possible in the educational area may have its origin in the very nature of the dominant educational practices in our schools and the primarily traditional culture of established ways of organisation.

The Internet can be used from different perspectives for teaching and learning. In fact, we have seen how the teaching staff tend to adapt ICT use differently, depending on the characteristics of their teaching practice, without technology necessarily intervening in the way they conceive the activities with their students. But the question is whether the Web seems to offer its greatest pedagogical potential when it is put to the service of the constructivist approach of teaching and learning. And, in this sense, the capability of technology to transform must be looked for, probably, in the ability of the teachers to reconsider their own conceptions and beliefs about teaching practices and to transform them.

Beyond the school environment, in the analysis of the relationship between academic performance, family environmental influence and use of the Internet by the students outside of the institution, we have identified what in sociological terms is known as the Matthew effect: boys and girls in a position of better academic performance and influence are also those that use the Web in more varied way, obtain better opportunities from it and, finally, a position of broader advantage.

It goes without saying that the social function that the school can develop to compensate for digital inequalities turns out to be key for the options of incorporation of a significant sector of young people in the Network Society. We find in our research that the way in which boys and girls are acquiring basic skills that allow them to make adequate use of the information networks are more related to the opportunities that young people find outside of the school than to those institutionally imparted processes of digital literacy. The school is not having an important role in the compensation and reduction of digital inequalities that are generated in the variety of situations students find themselves in outside of the educational institutions.

The expectations brought about by ICTs time and time again run up against the reality of our institutions. The complex workings of the educational system do not make us very optimistic. In the short term, it does not seem that a substantial modification of the established dynamics in the educational institutions and classrooms can occur in a way that would allow greater use of all of the potential that the ICTs and, specifically the Internet, places within its reach. Despite the researchers' repeated emphasis on the advisability of finding mechanisms that facilitate this evolution, it appears that the schools still have a large number of issues waiting to be resolved before they can efficiently confront the educational challenges that the information society poses for them. Undoubtedly, those in charge of educational policy and administration must assume part of this responsibility. But the educational institutions already have within their reach excellent opportunities for innovation in their information, organisation and communication systems and their teaching practices through the Internet. The directors and the teachers of the schools could take advantage of these opportunities for rethinking their educational practices by orienting them to meeting the challenges posed by the Network Society. It will be these professionals that, with their initiative, will end up taking a major or minor part in the educational potential of the ICTs. In any case, it cannot be expected that technology itself modifies the nature of educational activities that occur daily in the classrooms of our educational institutions.

The stage on which we find the process of integration of the Internet in our educational system appears prototypical of the initial phases: Internet is used in a significant way by a reduced group of teachers that are mainly characterised by being pioneering enthusiasts in the introduction of these technologies in the classroom despite all the types of limitations that they encounter. Another, more numerous group of teachers, has begun to follow in the footsteps of these pioneers, but at the moment they use the Web sporadically so that it practically has no effect on the teaching and learning processes in which they are involved. In this initial stage, the fascination with technology continues to be the main drive behind the introduction of the Internet, although following use among teachers they are diversified depending on other differential factors. In the next few years it is very likely that the presence of the Internet in the educational institutions shall increase significantly due to greater availability of digital resources and an increase in the ability of the teachers to use them. If the

tendencies that we have observed in our research are confirmed, more and more, as is happening in most of the countries that take us to some stages of advantage in the process of educational integration of ICTs, the weight of knowledge and non-technological ideas will be more decisive when it is time to successfully confront the challenges that the emerging social context will formulate in education. In this way, when the time comes when the teacher has some resources and sufficient technological knowledge, the possibilities of improvement that the Internet and ICTs appears to offer will materialise to the extent that the different actors of the educational community will be able to appropriately incorporate these technologies in the service of educational innovation. In the first place, in order to improve the teaching and learning processes such as we know them; secondly, to rethink these processes depending on how the learning contexts are beginning to evolve as a consequence of a greater presence of the ICTs; and lastly, to redefine the very objectives of education and the curricular structure of the system as a result of the new needs in our society that education must respond to.

All the indications that this research has provided us with makes us think that the processes of innovation through the ICTs will not happen by the mere fact that teachers have technological resources and knowledge within their reach. Many other aspects and some structural reforms will have to be encouraged that go beyond the field of the educational institutions' decision making area. But any of these changes will have to be carried out while taking into account the decisive weight that teachers continue to have as the fundamental element in education.

Bibliographical references

AINSCOW, M.; HOPKINS, D.; SOUTWORTH,G.; WEST, M. (2001). *Hacia escuelas eficaces para todos.* Madrid: Narcea.

AVIRAM, R.; TAMI, D. (2004). *Paradigms of ICT & Education. Are you a Technocrat? A Reformist? Or a Holist?* [Online]. [Read 25/08/07]. <http://www.elearningeuropa.info/>

BECKER, H.J.; RAVITZ, J. (1999). "The Influence of Computer and Internet Use on Teachers' Pedagogical Practices and Perceptions". *Journal of Research on Technology in Education*. Summer 1999. Vol. 31, Issue 4, pp. 356-384

CARNOY, M. (2004). *"Las TIC en la enseñanza: posibilidades y retos".* [Online]. [Read 01/03/06]. <http://www.elearningeuropa.info>

CASTELLS, M. (1999). *La era de la información. Economía, Sociedad y Cultura.* Madrid: Alianza Editorial.

CASTELLS, M. (2000). "Materials for an exploratory theory of the Network Society". *British Journal of Sociology*. Vol. 51, Issue 1, pp. 5-24.

CASTELLS, M. (2001). *La galaxia internet. Reflexiones sobre internet, empresa y sociedad*. Barcelona: Plaza & Janés.

CASTELLS, M. (2004). "Informationalism, networks and the network society: a theoretical blueprint". In: M. CASTELLS (ed.). *The network society: a cross-cultural perspective*. Northampton (MA): Edward Elgar.

COGNITION AND TECHNOLOGY GROUP AT VANDERBILT (1996). "Looking at technology in context: a framework for understanding technology and education". In: D.C. BERLINER; R. CALFEE (eds.). *Handbook of Educational Psychology*. New York: Simon & Schuster / MacMillan. Pp. 807-841.

COLL, C. (1996). "Constructivismo y educación escolar: ni hablamos siempre de lo mismo ni lo hacemos siempre desde la misma perspectiva epistemológica". *Anuario de Psicologia*. Issue 69, pp. 153-178.

COLL, C. (2001). "Constructivismo y educación escolar: la concepción constructivista de la enseñanza y el aprendizaje". In: C. COLL; J. PALACIOS; A. MARCHESI (comp). *Desarrollo psicológico y educación*. *Vol. 2. Psicología de la educación escolar*. Madrid: Alianza Editorial.

COLL, C. (2003). “Tecnologies de la informació i la comunicació i pràctiques educatives”. In: *Teaching materials for the Psychology of Education course*. Universitat Oberta de Catalunya. Module 4.

CUBAN, L. (2001). *Oversold & Underused. Computers in the Classroom*. Cambridge (MA): Harvard University Press.

CUBAN, L.; KIRKPATRICK, H.; PECK, C. (2001). “High Access and Low Use of Technologies in High School Classrooms: Explaining an Apparent Paradox”. *American Educational Research Journal*. Winter 2001. Vol. 38, Issue 4, pp. 813–834.

DEWEY, J. (1899). *The school and society.* Chicago: University of Chicago Press.

DEWEY, J. (1916). *Democracy and education: An introduction to the philosophy of education.* New York: Macmillan.

DIMAGGIO, P.; HARGITTAI, E. (2001). *From the ‘digital divide’ to ‘digital inequality’: Studying internet use as penetration increases*. Working Paper #15 [online]. Princeton: Center for Arts and Cultural Policy Studies. Princeton University. [Read: 01/03/07]. <http://www.princeton.edu/~artspol/workpap15.html>

ERTMER, P. A.; ADDISON P; LANE, M.; ROSS, E.; WOODS, D. (1999). “Examining Teachers’ Beliefs About the Role of Technology in the Elementary Classroom”. *Journal of Research on Technology in Education.* Fall 1999. Vol. 32, Issue 1.

IV EU – LAC MINISTERIAL FORUM ON INFORMATION SOCIETY (2006). *Lisbon Declaration* [online]. [Read: 01/03/07]. <http://ec.europa.eu/europeaid/where/latin-america/regional-cooperation/alis/documents/lisbon_declaration_en.pdf>

FULLAN, M. (2002). *Los nuevos significados del cambio en la educación*. Segunda edición revisada. Barcelona. Octaedro.

FULLAN, M.; STIEGELBAUER, S.M. (1991). *The new meaning of educational change*. New York: Teachers College Press.

GRAY, J. *et al*. (eds.) (1996). *Merging Traditions: The future of research on School Effectiveness and School Improvement.* London: Cassell.

HARGREAVES, A. (2003). *Enseñar en la sociedad del conocimiento*. Barcelona: Octaedro.

HARGREAVES, A.; I FULLAN, M. (1998). *What's worth fighting for in education?* London: Open University Press.

HERNÁNDEZ-RAMOS, P. (2005). "If Not Here, Where? Understanding Teachers' Use of Technology In Silicon Valley Schools". *Journal of Research on Technology in Education*. Fall 2005. Vol. 38, Issue 1, pp. 39-64.

HOPKINS, D.; AINSCOW, M.; WEST, M. (1994). *School improvement in an era of change*. London: Casell.

LIEVROUW, L. A. (2000). "The information environment and universal service". *The information Society*. Issue 16, pp. 155-159.

HOPKINS, D. (1996). "Towards a theory for school improvement". In: J. GRAY; D. REYNOLDS; C. FITZ-GIBBON; D. JESSON. *Merging traditions: The future of research on school effectiveness and school improvement.* London: Cassell.

HOPKINS, D. (2001). *School improvement for real*. London: Routledge Falmer Press.

JONASSEN, D.; PECK, K.; WILSON, B (1999). *Learning With Technology: a constructivist perspective*. Upper Saddle River (NJ): Prentice Hall.

JUDSON, E. (2006). "How teachers integrate technology and their beliefs about learning. Is there a connection?" *Journal of Technology and Teacher Education*. Vol. 14, Issue 3, pp. 581-597.

KENNEWELL S.; PARKINSON J.; TANNER H. (2000). *Developing the ICT Capable School*. London: Routledge.

KERR, S. T. (1991). "Lever and Fulcrum: Educational Technology in Teachers' Thought and Practice". *Teachers College Record*. Fall 91, Vol. 93, Issue 1, p. 114.

KERREY, B. (2000). *The Power of the Internet for Learning: Moving from Promise to Practice*. Report of the Web-Based Education Commission to the President and the Congress of the United States. Washington DC.

MARCHESI, A. (2000). *Controversias en la educación española*. Madrid: Alianza.

MARCHESI, A.; MARTÍN, E. (1998). *Calidad de la enseñanza en tiempos de cambio.* Madrid: Alianza.

MINISTRY OF EDUCATION (1999). *Education, Training and Research in the Information Society: A National Strategy for 2000 – 2004.* Finland [Online]. [Read 12/09/02]. <http://www.minedu.fi/julkaisut/information/englishU/index.html>

MINISTRY OF EDUCATION, CULTURE AND SCIENCE (2000). *ICT in education in the Netherlands – ICT Monitor* [Online]. [Read 01/06/02]. <http://www.ictmonitor.nl/english/index.html>

NIEDERHAUSER, D. S.; STODDART, T. (2001). “Teachers' instructional perspectives and use of educational software”. *Teaching and Teacher Education*. Vol. 17, Issue 1, pp. 15-31.

OCDE (2001). *Learning to change: ICT in schools. Schooling for tomorrow.* Paris: OCDE.

OCDE (2001). *The wellbeing of nations. The role of human and social capital*. Paris: Center for Educational Research and Innovation.

PAPERT, S. (1993). *The children's machine: rethinking school in the age of the computer*. New York: Basic Books, Inc.

PEA, R (1996). “Seeing what we build together: Distributed multimedia learning environments for transformative communications”. In: T. Koschmann (Ed.). *CSCL Theory and practice of an emerging paradigm*. Mahwaj (NJ): Lawrence Erlbaum. Pp 171-186.

PURKEY, S.; SMITH, M. (1983). “Effective schools: a review”. *Elementary School Journal*. Vol. 83, Issue 4, pp. 426-452.

PUTNAM, R. D (2002). *Solo en la bolera. Colapso y resurgimiento de la comunidad norteamericana*. Barcelona: Galaxia Gutenberg.

RIEL, M.; BECKER H. (2000). The Beliefs, Practices, and Computer Use of Teachers Leaders. Paper presented at the American Educational Research Association. New Orleans: 26 April 26 2000. [Online]. [Read 01/12/06]. <http://www.crito.uci.edu/tlc/findings/aera>

RINGSTAFF, C.; YOCAM, K.; MARSH, J.(1996). *Integrating Technology into Classroom Instruction: An Assessment of the Impact of the ACOT Teacher Development Center Project.* ACOT Report #22. [Online]. [Read 11/07/06]. <http://164.83.2.51/ACOT.html>

SAMONS, P.; HILLMAN, J. I.; MORTIMORE, P. (1995). *Key characteristics of effective schools: A review of school effectiveness research.* London: Crown.

SALOMON, G.; ALMOG, T. (1998). Educational Psychology and Technology: A Matter of Reciprocal Relations. *Teachers College Record*. Volume 100, Issue 1, pp. 222-241.

SCARDAMALIA, M.; BEREITER, C.; LAMON, M. (1994). "The CSILE project: trying to bring the classroom into world 3". In: K. MCGILLY (ed.). *Classroom lessons: integrating cognitive theory and classroom practice* (pp. 201-228). Cambridge (MA): The MIT press.

SENNETT, R. (2001). *Vida urbana e identidad personal*. Barcelona: Ediciones Península.

TWINING, P. (2002). "Conceptualising Computer Use in Education: introducing the Computer Practice Framework (CPF)". *British Educational Research Journal*. Vol. 28, Issue 1.

VAN DIJK, J. A.; HACKER, K. (2003). "The digital divide as a complex and dynamic phenomenon". *The information Society*. Issue 19, pp. 315-326.

VENEZKY, R.L.; I DAVIS, C. (2002). *Quo vademus? The transformations of schooling in a networked world*. [Online]. [Read 17/07/02].
<www.oecd.org/pdf/M00027000/M00027107.pdf>

WOOLCOCK, M.; NARAJAN, D. (2000). "Social capital: implications for development theory, research and policy". *The World Bank Research Observer*. Vol. 15, Issue 2, pp. 225-249.

ZHAO, Y.; FRANK, K. A. (2003). "Factors Affecting Technology Uses in Schools: An Ecological Perspective". *American Educational Research Journal*. Washington: Winter 2003. Vol. 40, Issue 4, p. 807.


UOC
IN3 Internet Interdisciplinary Institute
www.uoc.edu