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SOCRATES - MAILBOX

SYNTHESIS REPORT

JULY 1998

The Socrates - Mailbox project

A two-year Observatory project in the context of the ODL sub-programme of the SOCRATES Programme of the DG 22 of the European Commission, the Socrates - Mailbox project started in September 1996. It aims at studying the use of electronic communication systems in Primary and Secondary school environments, through an ethnographic approach. The experiences of 17 schools have been studied in six European countries.

The Socrates - Mailbox partnership

Seven organisations contribute to the Socrates - Mailbox project:

Eric Barchechath, Associate in ***Atelier*** (Italy) — formerly OpenStudio[1] — is main Contractor and Project Manager of Mailbox. An international consultant, he has expertise in the field of innovation in education and training, engineering of Open and Distance Learning (ODL) systems, Information and Communication Technologies (ICT) and social acceptance of technology.

Rossella Magli (Researcher), *Stéphanie Laurent* (Assistant Researcher) and *Yves Winkin* (Director) of the **Laboratoire d'Anthropologie de la Communication-LAC** at the Université de Liège (Belgium). The LAC is in charge of Scientific Coordination for the project. The expertise and main research domains of the LAC focus on: ethnographic approaches to communication in urban settings, inter-cultural communication, sociology of education, innovation in education and training.

Janet Jenkins, **Consultancy in Distance Education** (CIDE) (UK) has been for long involved in Open and Distance Learning. An international consultant, she developed her activities in designing and implementing Open and Distance Learning systems in diverse educational contexts, and now spends much of her time conducting feasibility and assessment studies for ODL and working on technology-based development in education and training.

Inger Lise Stieng (Researcher) and *Sigmund Lieberg* (Director) are part of the **Nasjonalt LaeremiddelSenter-NLS** (National Centre for Educational Resources) (Norway). NLS is concerned as much with pedagogical documentation as with technological resources for education. The centre also conducts research in specific pedagogical questions and produces learning support for distance education.

Dagmar Hexel, *Olivier de Marcellus*, *Marc Bernoulli* (Researchers) and *Fiorella Gabriel* (Director) in the **Centre de Recherches Psycho-Pédagogiques - Direction Générale du Cycle d'Orientation** (CRPP-DGCO) (Switzerland). CRPP is a research department internal to the Geneva Lower-Secondary school system (17 lower-secondary schools, 11,000 pupils, 1,700 teachers). CRPP develops a wide range of research on pedagogical engineering, educational use of technology in school contexts, classroom organisation and its impact on learning performance, etc.

Pierre Dunand-Filliol (Researcher) and *Raymond Morel* (Director) of the **Centre Informatique Pédagogique** (CIP) in Geneva (Switzerland). The CIP is the resource centre which manages educational technology for all the Geneva area and has special responsibility in teacher training related to technology.

Michel Arnaud (Researcher) and *Jacques Perriault* (Director) at the **Laboratoire de Recherche sur l'Industrie de la Connaissance of the Centre National d'Enseignement à Distance** (CNED, France). Their role in the project is that of advisers and assessors of project results and performance.

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1 OpenStudio di Jesse Marsh & C. changed recently its name to "Atelier".

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This report is written thanks to the contributions of all the SOCRATES Mailbox Partners. The opinions expressed and the analyses put forward fall under the exclusive responsibility of the editors-in-chief:

Eric Barchechath — Rossella Magli

1. Background: the history of the project

" ... [Our computer future] will be determined not by the nature of the technology, but by a host of decisions of individual human beings. In the end it is a political matter, a matter of social philosophy and social decision how we will remake and rethink our world in the presence of technology. When we talk about computers in education, we should not talk about a machine having *an effect. We should be talking about the opportunity offered us, by this computer presence, to rethink what learning is all about, to rethink education ".*

Seymour Papert[1]

" Perhaps the greatest of pedagogical fallacies is the notion that a person learns only what he is studying at the time. Collateral learning in the way of formation of enduring attitudes... may be and often is more important than the spelling lesson or lesson in geography or history... For these attitudes are fundamentally what counts in the future ".

John Dewey[2]

1.1 Our standpoint

Starting with two quotations, from Seymour Papert and John Dewey, is one way of dealing with the hidden imperative underlying any European-funded project: be brief, essential, to the point in your report. It should be a workable document: no room for philosophical proclamations, no indulgence in descriptions, no slow tempos of ethnographic narration. Indeed a difficult task for us, who have placed such a radical bet on a change in the method to study and understand the social changes taking place when Information and Communication Technologies (ICT) come into a school.

Ethnography needs time: time for observation, time for cultural immersion and appropriation, time for the construction of a narrative which can reflect the richness and complexity of what has been observed. Ethnography needs a style in its narration: like in most other scientific disciplines, style is not optional. It is one thing to describe reality through graphics and charts, and another through sketches and narration. And even inside narration, writing in the third person tells a different story than writing in the first person. It tells about a

1 S. Papert, Mindstorms: children, computers, and powerful ideas, (2nd Ed.), Basic Books, New York, 1980, p. 13.

2 J. Dewey, Experience and education, The Kappa Delta Pi Lectures. London, Collier Books, 1963, p. 48.

certain objectivity of the data. Writing in the first person, on the contrary, indirectly informs the reader that what is told is nothing but instant photography, a subjective illustration of a specific moment in an ever-changing flow.

This report, and that was our main difficulty, had to be written in the first person plural. This is a compromise and an epistemological choice. It is a compromise, because there is no unity of vision in our multi-cultural, multi-background, multi-sensibility team. The *we* may sometimes reflect the result of common discussions within the team, and sometimes the personal opinion of the material writer of this report. We try, however, to open up questions, rather than to close up answers. It is then an epistemological choice, because *we* feel that the field requires a fresh look and a reformulation of the leading questions. One cannot analyse the impact of cars on our society by simply considering them as "horseless carriages" and asking the same questions one would ask concerning carriages, only without horses. Cars are different vehicles from carriages. And as such, their symbolic value is different. In the same way, computers differ from books, from television, from white sheets of paper... And so do their symbolic and metaphoric values. This is precisely what we are trying to highlight and develop in our research.

We want to stress the value of the ethnographic approach we chose: we do believe that only an explicitly descriptive, self-reflective method can help free the domain from all the wishful thinking and implicitly prescriptive questions. These are polluting reflection on the deep social changes taking place. Inventing cars is not like removing horses and placing an engine on a carriage. Our work is but a preliminary step: it is not isolated, but it is certainly not in the mainstream of reflection on computers and education, neither in Europe, nor in the United States. But it is a necessary step, because we believe, like Papert, that computers are not an inevitable happening, deterministically producing effects: they are rather a wonderful opportunity (because so symbolically rich) to take the **political responsibility** to *“ rethink what learning is all about, to rethink education ”.*

We also want to stress the value of the ethnographic approach when looking for the invisible. We doubt that any questionnaire, any interview, could detect it. No chart, no diagram could express it. But some insight could be gained through patient observation, through questioning our own experience and comparing it against what we observed. In Mailbox, we took an explicit stand, that is to look for new configurations of what we call **implicit learning** (and that John Dewey called "collateral learning"), following the integration of ICT in school. Like Dewey, we believe that it is *“ the greatest of pedagogical fallacies ”* assuming that *“ a person learns only what he is studying at the time ”*. In school, children learn much more beyond the explicit curriculum. They learn not only to read, write, count... and certainly, not only practical skills for the labour market, as a new trend would have us believe. In school, children learn how to become individuals and members of society, they learn attitudes, they learn behaviours, they learn values. This is what we call implicit learning. And like Dewey, we believe that these attitudes (and — we should add — values), *“ are fundamentally what counts in the future ”*. This is not to say that **explicit learning** is irrelevant, or less important. What we feel is that the socialisation aspect of school is too often neglected in social research, especially when ICT are in question.

Our standpoint is that ICT has the **potential to help** transform in depth the socialisation features practised in school and, consequently, the way educational systems affect and convey particular psycho-affective and intellectual structures. We believe that this happens not only through what is taught explicitly, but also and especially through what is learned implicitly. The "communication" dimension could be the key that unlocks that transformation. It operates the transition of computers in people's lives from calculating machines to simulating machines in which to deploy virtual selves and extend physical presence beyond physical boundaries[1].

1 See S. Turkle, Life on the screen, Touchstone, New York, 1997.

In January 1996, when the Socrates - Mailbox project was formulated, we knew that the communication dimension of Information and Communication Technology was just developing in schools. (It should be remembered that the explosion of the Internet started for real in 1994.) We also knew that, as for technology use in the classroom, things were mainly happening thanks to pioneers. But the rapid technology innovation has made it sometimes difficult to consolidate the actors' knowledge on social uses, practices, learning effects, value-added and impact on the educational process and organisation of learning.

Advances in technology have been not only continuous; they have become radical in the last ten years. Their appearance in educational environments has often been stigmatised as deficient (with the exception of special education): in terms of individual and social use, educational institutional dispositions, technology integration, and in terms of educational processes and products. This clearly proves that technology in itself can do… nothing. As a consequence, some issues needs to be raised here:

- A market for ICT cannot be created on command, especially in a composite world such as a school: it is the result of complex social dynamics, in which economic arguments have their place but are not exclusive of other arguments of a much more social nature.
- Excellence of technology cannot make up for the lack of reflection on pedagogy and the poor implementation of new educational concepts. Similarly, it cannot make up for the lack of reflection on organisational issues.
- Overly high expectations weaken the potential take-off of technology use, as results never match ambition.
- This potential take-off, moreover, is not of an explosive nature, contrary to what was announced *urbi et orbi*, and it does not necessarily invade all educational activities.
- In addition, the promotional discourse on ICT provokes cognitive dissonance. When people get a glimpse of concrete experience of ICT, it is always far from what they have been told by promoters: as a matter of fact, teachers may fall prey to heavy doubts about their ability to understand what is expected from them. Two mutually exclusive perceptions of reality then coexist in their belief system, thus reinforcing inhibiting factors.

These remarks are necessary to understand the Socrates - Mailbox background and choice: we need to know what happens in real practice when learners use communication facilities in their classroom, and we need to go beyond what happens in terms of explicit learning. Our reflection focuses on what is implicitly conveyed, and presumably learned, in school: understanding the integration of computers from an anthropological perspective can contribute to the formulation of political choices that are consistent and sustainable from a social point of view.

1.2 Methodology

It may be worth stressing that both our way of collecting and treating data are fairly unusual. Meaningfulness was preferred to representativeness because there is no way, in our opinion, that quantitative methods could be used at this stage of development of ICT in schools. The phenomenon is too fluid, changes are too rapid, to be frozen in "objective" data. What we need is interpretative glimpses and open questions. We invited our partners to select a few schools where "things" were heard to be happening. Such schools did not need to be representative of other schools; they had to be "interesting" by and for themselves. We also invited our partners not to send questionnaires to the school authorities but to go and see for themselves. All too often, studies of practices are based on self-reports: people are invited to write about themselves (or worse: to fill slots which slice their practices into categories which are not theirs). One of the basic guiding methodological principles of the Mailbox project was to spend some time in the field, not one day or two, in the classrooms, "among schoolchildren" (to allude to Tracy

Kidder's book[1], which inspired several of us). And try to capture the normal everyday life, with and without computers. No showing-off, no special arrangement of activities to please the observer.

Of course, it was easier to set up as a guiding principle, and much less easy to apply — for many reasons. We mentioned at least one reason above: schools are well accustomed to receiving visitors for two hours, but not two weeks straight. Another reason has to do with one's own sensitivity and relational capacities: it is not that easy to "observe" school activities while twenty or more observers are observing the observer. Thus the different strategies used in the schools: a few of us did get involved in the day-to-day business of one or two classrooms for an extended period of time (up to three weeks in a row) — that is typically what ethnographers would call "participant observation" — while others repeated one or- two-day visits to the same sites for several months (thus emphasising observation over participation).

Plenty of notes were jotted down, a few photographs and videos taken (but not systematically) and interviews were conducted with students, teachers, and parents. Interviewees were not sampled statistically; they happened to be available while we were on the site or they embodied such roles and status in the school system that they had to be tapped. Again: meaningfulness and not representativeness. Similarly, the themes of the interviews were the responsibility of the investigators, within our research framework. We decided early on that there was no point in attempting to develop a common set of questions to be asked across Europe; only themes had to be shared. Regular meetings throughout the year allowed us to monitor each other's progress and difficulties.

We then wrote a "monograph" on our own fieldwork experiences. "Thick description" was requested, with hints at possibilities of interpretation. The objective was to convey to each partner a sense of "what happened" in the schools. Thus, each monograph started with a narrative of the "discovery" of the school. Not only do ethnographers stress that the first few hours are usually the richest in the whole period of fieldwork, but we felt it was important that we visualised each other's sites: the way the hallways smelled, the way the light flooded the classrooms, the way the different actors greeted the visitor. The monographs also offered plenty of dialogues between teachers and students, students and students. We had to hear the constant buzzing surrounding ICT-related activities in each of the schools we got to know. Some excerpts from the monographs are to be found in small characters all along the Synthesis Report, while the full-fledged monographs are annexed when they were deemed "publishable" by the author and/or the schools involved.

A close cross-reading of the monographs led us to discover common "themes": questions that each of us had addressed to the field, attitudes *vis-à-vis* ICT found to be somehow identical, recurring reactions from the teachers, etc. We also injected into this transverse reading of the monographs several general problems about implicit learning, power relations and ICT capacity for change, defined earlier on when the Mailbox project was shaped. We decided that it was preferable to write a report based on the interweaving of transverse problems and localised data rather than piling up layers of monographs. Sure enough, part of the ethnographic richness was to be lost in this Synthesis Report. So, there is the possibility to consult the basic material for our analysis in the monographs (downloadable from Mailbox Web site at http:tecfa.unige.ch/socrates-mailbox). In the Synthesis Report, we offer instead a platform of issues about ICT in schools that can be discussed across Europe. And the issues remain fully grounded in the empirical: no "shot to the moon" (as it is too often the case, dare we say, in the literature on ICT).

A first objection could be raised that our decision to blank out schools (and thus to leave out all contextual elements beyond the classroom context) may lead us to universalise local practices: as if the truth of the interaction (with ICT) lay in the interaction itself (to use

1 T. Kidder, Among Schoolchildren., Avon Books, New York, 1990.

Bourdieu's formulation[1]). We are well aware of that danger (and partly repair through making the monographs accessible). And we are as well aware of the symmetrically opposite danger: there is at present no solid body of knowledge about the impact of ICT on school practice across cultures that would allow us to build reliable relationships between classroom data and society and between (European) societies. We thus preferred to focus on a micro-analysis of everyday interactions within the classrooms. Our stance is not only a reminder of the modest attitude we have to keep at this stage of our knowledge in the field, but also to stress the amazing richness and complexity of micro-structures — they are well worth the effort spent in the following pages.

A second objection could concern the rapid obsolescence of our observations. Practices related to ICT in school do change very rapidly, and if we were to question our "observed" whether they recognise themselves, one year later, in the practices as we describe them, they would probably remark, "Oh, but we do not do that anymore!", "Oh, but things are different now!", "It is *passé*!". This may be in part a simple defensive reaction from the actors who have been "under observation" and who feel uncomfortable with the mirror effect. But this conflict has something to do with the multi-layered nature of time. While time is fast for those acting on the field ("changes are so fast"), it is much slower for the anthropologist seeking to unfold the slow motion of cultural patterns.

1.3 The fieldwork sites

The qualitative field work was conducted in six different countries (Belgium, France, Italy, Norway, Switzerland, United Kingdom). It was extensively prepared as to the methodological approach and the axes of investigation. This resulted in the elaboration of a set of analytical grids and guide-lines for conducting observations and interviews with teachers and children.

The requirements for each partner as defined in the proposal were one Primary school and one Secondary school by Country. This was the case in Italy, where the field work was conducted in the framework defined. For three countries (Norway, Switzerland, United-Kingdom) the partners in charge enlarged their investigations to a larger number of schools:

- 1 Primary, 1 Lower-Secondary, 1 Upper-Secondary for Norway whose educational system and the institutional context was judged by NLS as requiring differentiation among their school levels.
- 1 Primary, 3 Lower-Secondary, 1 Upper-Secondary for Switzerland. The institutional position of CRPP, which is part of the Lower Secondary education system, brought to conduct supplementary investigations in this sector.
- 2 Primary, 2 Secondary for the United Kingdom. This involvement in the UK context resulted for a part from the interest of CIDE in the project and the difficulty in recruiting the sites (over-booking being a form of insurance!). In addition, two schools were in England and two in Scotland. The education systems and cultures in the two countries are quite different.

In France, field work in a Primary school was not too difficult to arrange. But for Secondary education the first site that had agreed to participate after weeks of negotiation withdrew at the end of February, when the observation first round was planned for March. New contacts were made with a second school in March for an observation period starting in April, but this site also withdrew early April. And exactly the same happened with a third one, the observation of which was planned for May. The fieldwork finally took place in December 1997. These

1 P. Bourdieu, Esquisse d'une théorie de la pratique prédédée de trois études d'ethnologie Kabyle, Droz, Genève, 1972, p. 178.

occurrences can be taken as part of the observation of Secondary education. And similar events occurred in other environments. The partner in charge of the Belgian field also met some difficulties. The Belgian case is very interesting. Multiple telephone calls, interviews and visits demonstrated that in francophone Belgium, the "most advanced" experiences had not yet started, in spite of the wide media coverage. A more mature situation became suitable for observation during this Autumn and complementary observations took place, but only in the Primary school selected.

We would like to raise a few critical points from our experience of setting up the observations in schools. We found several common limitations:

- First limitation: even if it is not the general case, not all places which are profiting from media coverage on their ICT-based activities are really doing observable things.
- Second limitation: when concrete things are organised, it may happen that you can't really see what is done with computers which could not be done without, with an equivalent result.
- Third limitation: the idea that an observer may come from outside and see exactly what is done over one day, or even two or three, is perceived manageable in terms of things to show. But having an observer for 20 days raises the imaginary risk of deceiving the observer: to show that computers are not used eight hours a day. That is why it may happen that the observer is invited to watch a tailored experiment.
- Fourth limitation: there are many places where concrete things are done and integrated and where the teachers or the Principal are not looking for any type of publicity; these places are extremely hard to find, since the people belonging to these networks deliberately form a world apart. In some places in Europe there seems to be a culture of "hidden excellence", as suggested by our preliminary survey of potential school sites for fieldwork.

This report organises the analytical findings based on 17 monographs written by the different partners on each of the sites observed. It does not pretend to be exhaustive or to provide a complete picture of the use of communication technology in Primary and Secondary education all over Europe. It aims to show genuine practice and put this practice in context. Anonymity is respected as far as possible in order to prevent any criticism of the people we have met.

2. *Foreground: how ICT impact on learning*

There are dramatic differences in the experience of the schools we observed, and in the way computers are used. In some of the schools we visited there have been computers for more than 15 years; in others computers have only recently entered the classroom. Sometimes the equipment is obsolete, sometimes relatively up to date. In all the schools, the Internet connection is relatively new. We tried to choose schools where the new communications technologies that arrive with a connection were actively used for teaching and learning - electronic mail, the World Wide Web (WWW), in a few cases, video conferences and in only one case Internet Relay Chat (IRC), while in another, IRC is merely planned for the moment.

From our observations we can hypothesise an impact on three kinds of learning. First, learning to use the technology. This assumed considerable importance in most cases, particularly with the teachers. In most of our schools, it is commonly accepted that teachers need training and orientation in order to make good use of new communications technologies in class. Such training often focuses on technical aspects at the expense of educational inputs. In some cases, however, the pedagogical aspect was also incorporated in the training.

Second, learning via the technology was often used to support teaching and learning in a curriculum perspective (explicit learning). The teacher used communications technology to support, enrich and stimulate alternative strategies to existing classroom teaching and learning. In some cases, technology seemed to offer an opportunity to children to use different cognitive skills for the same learning objective, which was pursued in parallel through more traditional approaches.

Third, using communications technology introduced new ways of organising the learning settings and relationships. It is this type of change affecting the socialisation process, the hierarchical relationships inside the school community and having an impact on what we have called implicit learning, that lies at the heart of our study.

2.1. Learning to use ICT

In some cases, information technology is taught as a school subject, and appears in the national curriculum in some countries. This is not the majority of the cases we observed, but the situation is very much in evolution. As with teachers, the universal core of technology in the curriculum seems to have a technical bent - learning the basic skills. In some countries, however, the focus is put rather on the need to learn ICT-related skills, both for teachers and for pupils, as a way to foster a new <u>method</u> for teaching/learning school subjects. In other countries (but these experiences may be quite isolated), we observed cases where learning to master ICT was not so much a question of curriculum: the real issue at stake was the role of ICT in changing the global approach to education and to school. This was not always overtly stated, but often concealed behind the "traditional" slogan "technology literacy in a technology world". Only a closer look at the practices could reveal it. There is thus considerable variance in how different school systems, or even different schools within the same system, handle the teaching of ICT skills to children. Whatever the approach, the interesting question to ask would be to what extent it manifests a knowledge of children's learning styles, or simply incorporates the traditional teacher-centred approach.

The styles in learning to use ICT we could observe were different. The "bricoleur" (tinkerer) style is opposed to the "planner" style[1]. While the former is more an "impressionistic", "improvised" style, the latter requires a clear framework which allow learners to feel in control (instructions, learning steps, periodic assessment, etc.). A large number of the children we observed seemed to be more at ease with the "bricoleur" style. They liked to try and retry, explore alone and with the help of their friends. They rarely were discouraged by failures. In contrast to most of the teachers, they seemed to learn techniques and applications quickly and easily. And they learned them fearlessly. But this aspect was not always taken into consideration by teachers, who sometimes mentioned age barriers — certain children were considered too young for certain applications. These teachers also organised planned steps and time schedules for children to learn about ICT: what to learn, in which sequence, what for. Certainly, it is a matter of approach. But whether this corresponds to a conviction on the pros and cons of structured versus loose contexts of learning, or it is simply the reflection of some preconceptions and long-term established practices as to the way the children should learn, it is difficult to ascertain.

We did see young children coping with "advanced" applications, first with the help of a teacher or experienced fellow pupil, then by themselves. In some cases, teachers encouraged this "bricoleur" approach, letting children explore the machine functions with very loose guidance: what was important was the purposefulness of the frame for the activity. However, there are differences between children. We sometimes saw children left out, falling behind. We saw children bored. We saw enthusiastic children taking the lead in class, sometimes at the expense of less-confident peers. In primary classes we saw teachers trying to ensure that all children grasped the necessary skills, often encouraging collaborative work in pairs or groups to ensure that stronger and weaker pupils shared their learning. But amongst older pupils in some secondary schools, where group or team work is less common, we came across gaps in competence between those who regularly used computers and others who only used them occasionally. According to one of the observers, many of the more competent had home computers, and amongst these much of their skill was self-taught. But according to another observer the most competent users often had no computer at home. From these two remarks, it is obvious that nothing can be deduced in absolute terms, that is in terms of the simple differences between the haves and have-nots. We noted - indeed we were surprised by - the large number of pupils in our schools that had computers at home, even in socially disadvantaged areas. Fewer, but still a significant number in certain countries, had Internet access at home. Also in this case, the situation is rapidly evolving. Much more important for computer competence seems the role that school plays, the gap between the children's learning styles and those imposed by the teachers, the motivation framework, the purposefulness of the activities linked to the use of ICT.

We asked children their opinions: some loved computers for their own sake, because they are "quick and smart", others said they enjoyed the chance to work with their hands, some felt that a computer enables them to produce high-quality work that they feel proud of, others had pleasure in controlling the machine, some felt reassured by the possibility of cancelling any record of their mistakes. A minority of those we talked to were not at all interested in computers or computing. They sometimes felt they could not control them and that made them feel uneasy. Others told us that they just do not like them and they simply do not understand why everyone seems to make so much fuss about them. Others were simply not at all interested in the activities they were doing with them. Others were deceived by a "parsimonious" correspondent and

1 See S. Papert, The connected family, Longstreet Press, Atlanta, 1996. The term "bricolage" was first used by C. Lévi-Strauss to contrast the associative learning process common to non-Western societies against the analytical approach dominant in Western societies.

decided that e-mail did not interest them at all. One invoked more Latin and History. But generally speaking, children and computers is a matter of love affair.

Pupils find the technical aspects of using ICT easier to learn than some of their teachers. And not all teachers are ready to cope with the idea that children can do certain things they cannot do. In some cases they feel that they must make every effort to grasp the technology used by the pupils, and that the technology should not be available in class until they have done so. But some teachers are ready to learn with and from children, recognising that they are quicker learners than adults. This shift towards learning together can be related to the issue of the reorganisation of learning settings and school hierarchies, in particular with issues of trust and control, discussed in depth later.

Some pupils told us they were aware of their teachers' discomfort with technology. Several thought they, as pupils, should help their teachers, and some did so; a few were critical of their teachers' conservatism and incompetence with technology, some were even frightened that teachers would be displeased if they demonstrated their own competence where teachers were lacking, for example, by submitting word-processed homework.

Teacher's readiness to learn from children is an attitude which seems to affect deeply the use of ICT in school. In several cases we felt that use of ICT had its origins in the creativity of an outstanding teacher. The style of relations between teachers and learners in a determined cultural context, and the type of school organisational environment is also related.

2.2 Learning via ICT

Learning to use technology is more than an end in itself. In some European countries, where policy-makers have a vision of the use of ICT, massive investment in the development of technological infrastructure is intended to enrich the school environment and make the information available to all. In these countries, policy-makers often work more closely to the "base", school staffs, teachers, parents' associations. In other countries, on the other hand, public investment has been episodic and sometimes opportunistic. Policy-makers did not manage to develop a long-term consensus on their intended action, or simply their intent was so contradictory that policies turned out to be rather anecdotal (and not necessarily cheap). As a result, in these countries views are much more controversial and a stronger scepticism is expressed on the educational virtue of multimedia software (and on its general quality), especially from the "base". The dramatic failure of former top-down initiatives has engendered extreme caution in certain countries, not only on the teachers' side but also on policy-makers'. A new trend, however, can be detected in these countries: bottom-up initiatives are flourishing and successfully subverting the ancient top-down logic. Everywhere, ICT (and especially Internet), seem to gather more consensus than Information Technologies (IT) used to. It is difficult to say to what extent this consensus is based on consolidated evidence, on emulation effects, or on a vague intuition that modern is "good". But it is a fact that this is rapidly changing the landscape of computers in school.

We can presuppose that some questions have been asked (and probably answered, either explicitly or implicitly): does using communications technology impact further on the curriculum — or we could say — on explicit learning? Does it add to the value of off-line IT? And in what sense? Our evidence is mixed, partly because the uses of technology are not stabilised and still ask for being invented. Partly because it is difficult to assess learning in relation to a determined technology when several "technologies" are combined: how much learning derives from reading? from listening? from surfing the Internet? from emulating (the teacher, the schoolmate)? How much from a combination of all these "technologies"? And for whom? Can we generalise?. But, as we were arguing above, it is a fact that the communication component of ICT has changed the nature of computers, and consequently their impact on children's and teachers' perceptions. It does seem to mobilise most students' (and some of teachers') motivation. As such, it is legitimate to suppose ICT has an impact on explicit learning.

We have seen four main technologies in use, each with different communication characteristics: e-mail was used in most schools; the WWW on the Internet was used quite frequently, but perhaps less often, and to less good effect, than often predicted; video-conferences via computer links (interactive, occasional, a group medium) made an unexpected appearance on a few occasions and were warmly appreciated by users — for some this was perhaps the most exciting of the newly accessible communications technologies. Finally there was one case of IRC use.

In all cases, the best uses of communications technologies had a clear purpose, integrated into a curriculum framework or embedded in a complex learning activity. That seemed generally easier to achieve in primary schools than in secondary schools. We did note some discontinuity between use of ICT in primary and secondary schools; we saw primary schools forging ahead creatively, with a lot of secondary schools apparently stuck at the starting line. An interesting question to explore is what will happen when the present generation of youngsters in primary school enters secondary school.

2.2.1 Learning at Primary schools

Using ICT is generally intended to contribute to children's mastery of core skills at primary school, particularly reading and writing development. We were struck on several occasions by the special appeal of electronic correspondence. Children seemed to take it very seriously. For some, it was their first experience of writing letters. This generation of school children is in the position to have an exciting challenge — to develop an art of e-mail. We saw something of this emerging, for example in the discussions of suitable ways to greet correspondents, the identification of questions as a key element in successful correspondence, and the difficulty of formulating the type of question that leads to fruitful dialogue. Moreover, e-mail provides teachers with the opportunity to create a conventional framework for children to develop social and relational competencies and understand the importance of conventions. This last element seems very important: it should not be overlooked that whenever the conventional framework was not firmly established and monitored by the teachers, pupils were strongly disappointed and correspondence was interrupted.

According to some teachers — but the issue is controversial — using communications technology can also make a contribution to language development. In their correspondence, some children showed they were sensitive to different registers and styles of communication, and were keen to write to a high standard of accuracy; the group editing where finer points of style were debated by quite young children was sometimes remarkable. In some other cases we observed, however, a certain colloquiality in the messages exchanged and no particular interference by the teacher, as if formal language rules were not the issue at stake when e-mail is the communication mode. For bilingual children, communications technologies can be particularly stimulating. The fact that they can control the pace of communications they create, edit and refine, gives confidence to those who are still not in command of the language of the majority. Sometimes writing an e-mail seemed to be a pretext for the child simply to manipulate the machine and enjoy a certain feeling of power in front of the rest of the class. Younger children using the Internet found some of the reading demanding - the Internet does not follow the rules of graded readers — and asked their teachers questions about vocabulary and concepts which they might have passed over in solitary library reading.

For other core curriculum subjects — maths, science, history, technology — the potential of communications technology to enhance learning seems to lie mainly in interdisciplinary projects and collaborations with other schools, classes or sometimes contests: exchanging weather data and making graphs; contests between schools on mathematical problems via the Net; class projects where children find information and data on the Web, etc.

2.2.2 Learning at Secondary schools

Communications technologies were far more difficult to observe at secondary schools. The different organisation modes of secondary schools have an impact on how learning is arranged and how ICT are used. In some cases, Internet and e-mail were the focus of special projects, with activity limited to time-tabled class sessions in the school computer lab. In such circumstances, the learning process seemed different in style from other lessons in a normal classroom. In other cases, much use of communications technologies was restricted to lunch breaks or after school activity. This stems partly from the organisational inheritance of the ancient subject divisions[1] which prevents comprehensive strategies for the use of ICT. For now, we had the sense that the penetration of communications technologies into secondary schools was far less advanced, although their technological resources and infrastructures were in general better. We identified a number of issues relating to curriculum-related learning.

First, the teacher is linked to a subject, not to an age group. In primary schools, one teacher is largely responsible for a class. In secondary schools, a teacher teaches a particular subject at different levels to children of different ages, and in large schools a teacher may belong to a subject department with several colleagues. These departments decide how their subjects should be delivered, with the result that innovative teaching approaches are often diffused department by department, and may be slow to enter some parts of a school.

The examples of uses of communications technology that we observed in secondary schools are thus not necessarily representative. We saw several cases where e-mail is used for language teaching. We also visited one secondary school where the language department could not see how it could use ICT. We came across one interdisciplinary project, where a class was preparing a report on local culture and environment for exchange with schools in other countries. We met teachers, constrained by examination syllabi, who were anxious to find ways in which communications technology could assist them to meet exam requirements; we found some, in geography and physics for example, who saw such potential.

Some teachers have incorporated elements of communications technology in projects. In some cases, these were initially done outside school hours, in lunch-time or evening clubs. One project was a voluntary club at the time of observation, but deemed so valuable that it was subsequently time-tabled into the curriculum. Another interdisciplinary project that linked primary and secondary schools was run in lesson times in the primary schools, during lunch breaks in the secondary school. In one school an Internet club met during lunch breaks, and the pupils spent some of the club time working on school web pages.

The value of e-mail at secondary school was not always so obvious. Even learning a new language was questioned because of the internationalisation of language networks and the consequent impoverishment of the language exchanged. Furthermore, the written expression is only a small part of language learning, and whenever the exchanges focus on specific themes and the elaboration of common texts, the technicality of the language requires very strong contribution from the teachers, resulting in a very passive attitude of the learners. Where e-mail fit into a sequence of events, such as in the creation of an inter-school knowledge network, it seemed to be of more value.

Video conferences in our secondary schools were a rare event: in one, we noted that the pupils prepared carefully for the event. It thus became the centrepiece of a major group activity. As with many of the e-mail exchanges, it stimulated the pupils to perform to a high standard.

1 Although not generalised to all countries at lower secondary level, it is, however, a common feature to most school systems.

2.2.3 Special education

One of the Mailbox schools was a primary school for physically disabled children, and we came across individuals with learning difficulties in several schools. The physically disabled children had used computers in the classroom from their first entry to school: for some, computers were their means to write and speak. The new ability to communicate beyond the school opened up the world — otherwise inaccessible — to these children, and raised their status to equal their able-bodied peers.

Slow learners using computers could work at their own pace; in the correspondence groups we saw in action, they could have a role such as typing letters off-line; computers seem to allow such children to produce high-quality work that they can be proud of. We came across cases of children with cognitive impairment who yet had technical intelligence, liberated through computers. And we also noted that, on occasions, disruptive or disturbed children found enjoyment in using computers.

2.3 The impact of ICT on the organisation of learning settings

Much has been said and written about changed and changing learning for the Information Age. The debate has often focused on the content of learning — the curriculum of the 21st Century. Our focus is rather different: stimulated and supported by information and communications technologies, the nature of the learning process and the socialisation processes that are implicitly learned in school are changing.

Much of what we observed in schools suggests that we are at present in a transitional phase. Some teachers are, in the main, using the new technologies with children in ways that reproduce traditional teaching and learning, but on a wider stage. For these teachers, it is essential to remain in control, and the safest way is reproducing successful models of the past. We also met teachers fully assuming the paradigm shift from teacher-centred to learner-centred focus, organising the learning environment and activities around pupils' autonomy.

We have also seen new learning emerging, learning where process is as important as content. The use of communications technologies in class, live and on-line, begins to disturb preconceptions about the learning process — a shift from a sequential and linear process, to one that is iterative, multidimensional; new, expanded dimensions of reality coming into view; relations between teachers and learners change, as does the locus of control of knowledge: the teacher is no more the only source of authority and power in the class — authority and power being more on a collective basis. New patterns of collaborative learning could add unexpected value to process and outcomes; difficult issues arise, for example, of evaluating individual achievement against shifting objectives and group activity.

All these issues emerged in our observations, and are discussed more in depth in the chapters ahead. Together, they form a picture of learning that is very different from tradition. We became increasingly aware of the complexity of this new learning, the inter-relatedness of its various aspects. If the new patterns take root, teaching and learning in schools could be transformed. The whole relation to society, as it is conveyed by school, could be transformed.

The question is: are schools ready for this transformation? We saw teachers taking on new roles, putting flesh on the notion of teacher as "guide on the side", not "sage on the stage". We saw children as technology leaders, teachers as curriculum leaders. And in a few cases with longer experience, we saw the role of the school beginning to change. ICT can stimulate a school to change as an organisation, because it opens up questions on what is learning and what is an organisation supporting learning. It does so the more a school is flexible and open to incorporate the changes that ICT logically brings: space, place and time take on different dimensions, hierarchies are shaken and reconstituted on a different basis, the relationship to control takes on a new basis, the relationship between content and process changes (process acquiring more importance as a way for children to acquire knowledge, in the framework of the shift of the locus of control).

But nothing is happening naturally. Let us once more borrow Papert's wisdom to conclude our chapter: "What is happening now is an empirical question. What can happen is a technical question. But what will happen is a political question, depending on social choices"[1].

1 Seymour Papert, Mindstorms: children, computers, and powerful ideas, op. cit., p. 29.

3. Tracks from the field: eight ideas about ICT in schools

As every actor in the field can observe, obsolescence characterises the state of ICT in schools. What was true about ICT in schools last year is not true this year anymore. We therefore thought that there was no point about trying to set up the photography of situations which would have vanished the day they were printed. We preferred to use our data to suggest analytical ideas.

We offer here eight ways of thinking about ICT in schools which may have some longevity. Such approach may turn out to be more useful to actors and decision-makers than mere descriptions of outdated situations. But our leads are not shots in the sky: they are grounded in actual observation. The following pages can be read both as stories and as constructs for their analysis.

v

- Organisateurs avec un "s".
- Pas "tu t'est", "t'es".
- Avance s'écrit avec "an".
- "T'es?" Non, "tes!"

(Two children working together in primary school)

3.1 Relating to self and others

3.1.1 Learning self-reliance

Whenever Information and Communication Technologies are concerned, the "learner's autonomy" is generally assumed. This is where we would like to start to dig a little bit beyond the surface. An equation is usually established between the presence of a machine in the learning environment and the "sacred trinity": computer shows up and *autonomy* appears, *collaboration* springs and *learning is more effective*. This picture portrays school as a universe of linear and functional relationships, deprived of any affective, emotional and symbolic values: machines are machines, teachers are knowledge dispensers or knowledge facilitators and learners are eager to learn. No alchemy is needed. The definition of the function is sufficient to prove that the function is taking place and that actors and "actants"[1] are fulfilling the expectations of the narrator. Of the three terms of the trinity, we will consider the first two in this chapter: autonomy and collaboration.

1 The notion of "actant" in social sciences includes actors and their strategies as well as their value systems and ideological principles guiding their action.

We first need to understand what we mean by *autonomy*, before defining the type of impact that ICT can have. Let us say it is first and foremost the process of strengthening one's own identity, of gaining self-confidence, motivation, independence, initiative and of accepting new models of power relationships. Let's call it "self-reliance", precisely to stress the identity component. For young children, self-reliance means to weaken the umbilical cord that ties them to their teacher and protects them from that sometimes "uncomfortable" thing that growing up turns out to be. For adolescents, it means not to confuse self-reliance with selfishness, arrogance and lack of respect. For both young children and adolescents, it means to learn how to share with their peers, to negotiate solutions with them without always having a judge censoring "good" and "bad" behaviours. Self-reliance cannot be seen exclusively in relation to the individual; the collective dimension, the capability of self-regulation in relation to the collectivity is an essential component in our notion: there is no autonomy without a collectivity and no democratic collectivity without individuation. Self-reliance, finally, means taking an active role in the production of knowledge.

On the teachers' side, choosing to use ICT might indicate a pedagogical option in favour of "open" learning situations, and indirectly of enhancing children's self-reliance (i.e., global tasks, independent student activity, interdisciplinarity, team learning rather than whole class teaching, collaboration rather than competition, discussion rather than silence, etc.). However, we observed a certain difference between theoretical choices and actual school practices. While in some cases, computers were used by teachers as a fundamental and powerful component in the process of enhancing children's self-reliance, in other cases, computers were used to provide exercises only with a level of difficulty deemed appropriate to the development of the child and therefore "easy to do", or to give feedback on a simple "drill and practice" mechanism, or simply to provide information. One may wonder whether autonomy and self-reliance are enhanced in such easy uses of computers; the pupil's active role in the production of knowledge does not seem to be stimulated in such a framework.

Furthermore, choosing to use ICT may sometimes be just a matter of following a trend and keeping up to date. In other cases, this choice is part of a complex power strategy *vis-à-vis* colleagues and school management, rather than a pedagogical strategy *vis-à-vis* the children. ICT *per se* do not grant autonomy to children. Our observations indicate that an appropriate pedagogical approach is required to produce an impact on learners' self-reliance — but not only: we would like to suggest that teachers need to take explicitly positive organisational steps to foster autonomous activities, mutual aid and collaboration between students.

In particular, several factors can contribute to a successful experience of ICT aiming at pupils' self-reliance: the way a class is organised, the awareness of the teacher and his/her capability of renouncing traditional prerogatives of control or of being the only reference point, new modes of managing class activities, less directive on the spot but requiring a considerable preparation, emphasis on learners acquiring learning methods as opposed to feeding learners with information and notions. Our observations suggest that the autonomy and active role of pupils are coupled with strong organisational initiatives on the part of the teacher. These initiatives, in the most successful cases we observed, are so embedded in the process that they are hardly visible and seem "natural" elements of it. As a result, these positive organisational steps free the teacher for other tasks. As a result, we can suggest that children's self-reliance, mutual aid and collaboration between members of the school community are not only a goal and a consequence related to a (certain) use of ICT; they are also a necessary condition for its efficient use.

Here is a story in which a teacher experienced what the lack of autonomy on the pupils' side can create in terms of overload for the teacher herself. Her behaviour actually seemed to reinforce her pupils' dependence upon her. Those pupils, at the outset, were regularly stumped by technical problems. In addition they had practical problems of computer manipulation: they were unfamiliar with the procedures and they considered the teacher their sole source of help.

> ***"Madame, Madame"***
>
> Lors de notre première visite en classe (14-15 ans), les élèves doivent finir leur CV préparé au préalable à la main et corrigé par l'enseignante afin de l'envoyer aux correspondants. Les élèves plus avancés recherchent et consultent les premiers messages reçus. L'enseignante donne peu d'instructions générales à la classe, elle passe d'élève en élève, sur demande ou spontanément, pour expliquer les manipulations techniques. Elle est constamment sollicitée pour : aider des élèves à se débloquer, entrer dans le système, retrouver un message, sélectionner les adresses des correspondants, sauver, composer un nouveau message, envoyer. A ces interventions techniques s'ajoutent les renseignements liés à la langue : demande de voc, de tournure de phrase... La gestion de la classe ne paraît pas facile pour l'enseignante durant les premières leçons, car les élèves jouent un jeu de facilité en appelant sans cesse “ *Madame, Madame* ”, jeu dans lequel l'enseignante entre. On peut prendre comme exemple le début de la seconde leçon : l'enseignante s'adresse à la classe en anglais pour donner les consignes : prendre les disquettes, prendre les mots de passe, ouvrir le courrier. Les élèves s'assoient à leur poste et commencent le jeu du Madame, Madame : “ *Madame, Madame, comment il faut faire? Madame, Madame, ça marche pas...* ”. Certains élèves semblent s'amuser de ces appels car ils lancent des Madame, Madame, puis laissent tomber, ou déplacent leur demande vers un camarade. Deux filles qui attendent depuis un moment sur l'enseignante font la remarque : “ *ce qui fait ch..., c'est que c'est beaucoup trop peu une seule prof à la salle d'info; il en faudrait plusieurs!* ”

This example is interesting because it shows us that pupils' self-reliance is not only a matter of competence (technical, in this case) but also a consequence of an organisational choice made by the teacher. This teacher could have organised the class differently to give the pupils greater freedom in their work, but she did not. She told us she should have given the whole class a briefing: “ *Some kind of demonstration on the overhead projector. I did give them a hand-out, but they never read them* ”. Actually, when we interviewed the pupils they said they hadn’t had a hand-out, but that it would have been practical to have a written note of the various steps as “ *the teacher would have been less stressed and we could have got into the workshop more quickly* ”.

The language aspects were similarly organised. The teacher gave information on request, but hadn’t thought to distribute the dictionaries (available in a cupboard in the classroom). She missed an opportunity to help pupils get the habit of using reference material, even though she realised that taking on the role of a walking dictionary was not much help to them.

This teacher was in general over-solicitous, but it did not occur to her to encourage collaboration between children in order to lighten her own load. She told us that children spontaneously turned to helping each other in the workshop, especially when they were following a course in information technology as a subject, where they were expected to work in pairs. “ *In electronic communication it is more difficult, as they are alone at their computers* ”.

In this case, the teacher seemed reluctant to give up her traditional role of unique reference for the class. She entered the "game" imposed by the students and tried to answer all the questions. Doing that, she abdicated her role of organiser that the new activity would have required and kept her central role as repository of technical and linguistic knowledge.

In spite of the fact that it was never an explicit objective, these pupils acquired a certain technical autonomy nonetheless: by their fourth lesson they knew the technical steps, could sort out problems when they got stuck and could even help their friends when they "crashed". Technical autonomy could thus be acquired simply by regular attendance at the workshop. But we would like to suggest that it is an autonomy derived from the progressive mastery of skills. It has still nothing to do with the global capacity for self-reliance, resulting in a general proactive attitude to problem-solving. In other words, what would the students do the next time they feel they cannot handle the situation but their teacher could?

In some other classes, especially at primary level, teachers had very firm opinions and strategies concerning the students' autonomy: *“ Autonomy as such is as much a condition as an objective. Without achieving it quickly, one can’t have a computer in class ”* — one of them said. The following story gives an example of a teacher's intervention, which is neither directive nor penalising, but which succeeds to encourage the pupil to explore his own resources.

> ***Pupil-teacher-machine interaction in text-writing: a multi-layer approach***
>
> F. a de gros problèmes scolaires et affectifs, mais est un des "pros" de l'informatique de la classe. Il annonce qu'il va faire une longue lettre, car il a peur que son correspondant veuille le laisser tomber. Il tape assez vite, mais en regardant rarement l'écran, donc en faisant beaucoup d'erreurs.
>
> Première version du message : *Tcho c'est F. comment ca va moi ca va bien j'ai rescu ton message tu ma si tu correspon ceput chez moi bien je ne correspond pas de puit chez moi par ce j'aime mieu corresponre depuit la classe. etc...... Si tu veux je peux t'envoyer mon outil préferé sur le Web.*
>
> L'enseignant, appelé pour corriger le texte, lit tout son message d'un seul souffle pour lui montrer le manque de ponctuation. *“ Relis le tout en mettant de la ponctuation. C'est intéressant ce que tu dis, mais on comprendrait mieux avec de la ponctuation. Relis-le comme si tu parlais ”.*

The first teacher's intervention aims at orienting the reaction of the pupil, but it is neither directive nor penalising. It helps him focus on the main weakness of his work and at the same time it encourages a sense of pride in the pupil ("What you say is interesting, but...").

> Deuxième version. Le maître revient contrôler : *“ T'as mis des points? En fonction de quoi? ”* . F. : *“ Quand je parlais d'autre chose ”*. L'enseignant le relit à voix haute. *“ Faut encore avoir un bon souffle, hein? ”* F. : *“ J'ai mis des virgules! ”*. Maître : *“ Relis encore une fois... regarde que les verbes, OK? Moi je corrigerai le reste. Déjà pour les trouver ce sera un bon exercice. Tu contrôles les terminaisons ”*. F. (à l'observateur) : *“ Ah il est méchant! Il veut me faire faire la conjugaison ”*. Il s'y met sans rechigner, en se parlant à haute voix : *“ Avec l'imparfait, il y a un "s"? ”*

With the help of some irony, the teacher leads the pupil to continue working at the improvement of his text: the teacher's commentary becomes more precise, but still engages the pupil's reasoning.

> *“ Ah! je ne vais pas me fatiguer! ”* (va chercher son cahier de conjugaison). Les verbes du troisième groupe l'amènent à demander conseil à une élève à côté. Le maître, rappelé pour contrôler le félicite et lui propose encore de contrôler les pluriels. Au prochain passage de

> l'enseignant, l'observateur lui dit que F. aurait voulu mettre son message en pièce jointe pour pouvoir utiliser le correcteur d'orthographe. Le maître l'encourage de le faire. F. fait ainsi une nouvelle série de corrections. Nous constatons que le correcteur — loin d'être une béquille — donne lieu à un travail intéressant, puisque le plus souvent il exige de l'élève un choix entre beaucoup de possibilités, tant son orthographe est fantaisiste. L'enseignant revient pour indiquer encore quelques corrections. F., très valorisé par cette production (assez exceptionnelle par sa taille), demande encore s'il peut y rajouter un dessin. (F. impressionne ainsi ses camarades car on n'a encore jamais fait de dessin avec la messagerie dans cette classe).

Here, it seems that the teacher's encouragement of the pupil's exploration produced some positive effects. The teacher managed not only to motivate F. to improve his spelling, but also led him to undertake an autonomous initiative (making a drawing) that gave him value in front of the class and helped improve his self-esteem.

Some teachers agree that their role as well as pupils' role are undergoing a deep revolution, and that ICT are playing a part as a motivating factor for pupils to feel responsible for their own learning: *" It is they who produced the screen. They have a feeling of domination over the machine; they can insult it "*. In addition, children can work at their own pace, restart an exercise or a text without being judged for their mistakes. In a normal class, this would be the responsibility of teachers. A. is teacher of History and Artistic Education in a primary school. What she said to us is symptomatic of a new trend progressively establishing itself, especially in primary schools:

> *It is necessary to re-think the way of conceiving teaching. Children should no longer be obliged to remain in static positions. They must be actively involved. And the teacher should become a mediator, a facilitator. Discoveries must become the children's own discoveries. Of course, I can teach them that 2 + 2 = 4. But there are abilities they need to acquire "alone". Abilities that will not be useful only to succeed in school, but for life... My task will be that of reassuring them, of giving a source from which they can obtain certain information... Children are not hollow containers in which to pour some information, and then shake them to see if they make bubbles... The computer allows children to work. That is, it helps them acquire an active role in the elaboration of knowledge, because it absorbs them completely, encourages their concentration and stimulates their imagination.*

In A.'s school, ICT are conceived as creative media, rather than simple tools: around them, a set of complex interdisciplinary activities are developed, the more so complex that the school is very poor in terms of technology infrastructure, material resources and space. A. works together with three colleagues of hers in six or seven interdisciplinary projects involving mixed interclass groups. She is not a technology fanatic. On the contrary, she is unable to operate a computer and *" had always thought that machines induced a passive attitude "*. But now, taken over by the enthusiasm of her colleagues and children, she has become one of the strongest supporters of all the activities involving ICT in her school. She feels that these stimulate the children's curiosity and autonomous initiative. Furthermore, she believes that ICT can help children "learning to learn", as opposed to "stocking contents". These points will be more fully explored in the next chapter.

3.1.2 Self-reliance, collaboration and teamwork

Our observations provided us with some interesting materials concerning the relationship between self-reliance and collaboration, whether a general attitude or a more explicit organisational choice for working in class, such as teamwork. The short excerpt reported below helps us focus on two important questions concerning teamwork and children's autonomy: the ways working teams are formed and the role of the teacher in guiding the teams. Both questions are of course related to the degree of autonomy left to the children. Although they do not exhaust the topic of collaborative work in classroom, they seem central to us in so far as they concern the question of socialisation models conveyed by school. Once more we are in the presence of a model of micro-society, with its behavioural norms and "political" values, implicitly conveyed through an educational practice in school.

Forming a group around the "Turtle"[1]

A primary school. The mixed team of the "Turtle" takes their seats in the fifth grade, led by P. the teacher: L. and S1. (fifth grade); N., E., C., S2., and S3. (fourth grade). M. and S4. (fifth grade) are absent today. They have already read the story in English, re-written it in Italian (with the Italian teacher), and prepared the characters and the theatre out of cardboard (with A., the teacher of History and Artistic Education). They now have to work with P. on the graphical realisation at the computer, using Logowriter.

“ *Do we keep the teams as last time?* ” — E. asks full of hope, holding the hand of her best friend N. “ *Do you really think we are immediately starting at the computer? You are too impatient. First comes the project!* ” — says the teacher. She continues explaining that now she would like to hear the story, to see it played with the help of the cardboard character. Then, they will have to choose three sketches and divide the work for three teams to draw the scenes on the special millimetred paper. Only then will they be ready to draw on computer in their teams. She adds ironically: “ *Anyway, don't you think it would be nice to try new experiences? I think you should try to change the teams today!* ”.

The children get organised: E. will be the narrator, while N. and L. will animate the theatre. The teacher asks them now to divide the sequence into three scenes. A long discussion follows among the children...

... [the teacher] proposes they create new teams. Three teams of three people each (including those who are absent). After some discussion, the teams are now created and the children seat themselves around the desks: N., E. (both exultant, because they are together as they wanted and the teacher does not intervene) and S1.; S2., S3. and L.; C., M. and S4. Since these last two are not present, C. ends up starting the work alone. She looks disappointed but does not protest. L. volunteers to modify the teams, but both the teacher and C. say it is not very important. “ *The work will take a long time; you should not worry. Today we are only starting the drawing on paper* ” — the teacher adds. “ *Nooo! We want to go to the computers.* ” — the children cry. “ *One has to learn to be patient in this world* ” — the teacher teases them.

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1 The full story is reported in the Mailbox monograph "Turtles, fairy tales and pen-friends. Enhancing socialisation, self-reliance and creativity in an Italian primary school".

Here, the teacher tries to lead the formation of the team on the basis of a simple criterion of "variety". She encourages the children to work with different classmates, but she is not prescriptive. Teams are not formed in order to balance competencies among the most- and the least-skilled pupils (as in some other cases we observed), nor according to any other set of requirements. The teacher's directions are not firm; they are suggestive. She hopes, in a way, that her children will autonomously take the initiative of working with people other than their reassuring "best friend". In the end, she does not object to a team formed of two very close friends (who do everything together). She does not want to impose her vision of what teamwork is, but she tries patiently to convey a "sensitivity" for collective work. She also invites pupils to explore their different individual styles, as they are stimulated through work in different teams. It is not surprising that, in the same school, another common way of forming teams is to draw lots. What really counts is for children to adapt to all the possible different conditions and balances. A social norm is there, but it is not imposed. Specific values are underlying the norm, but they are conveyed through a sweet/ironic attitude on the part of the teacher, which is supposed to produce its effects in the long term: children have to be autonomous in their choice, but the goal to achieve is that of a harmonious team activity, independently of the way a team is formed.

In another case, in the primary school of MC, some requirements are established for forming teams, but initiative is left to the children, who seem to cope quite well and tend to form rather balanced teams. In other cases, those rules are codified and applied by the teachers.

As there are several possible ways of guiding a child in front of a computer, as we saw in the first section of this chapter, so also are there several possible ways of guiding a group. Teachers can assume roles going from firm guidance in all the interactions among the pupils, to more discreet roles as stimulators of children's initiatives and regulators of possible conflicts, as in the example above of the "Turtle", to a much more unobtrusive role. In the following interaction taking place in a primary school in an area full of social tension, we observe the teacher providing a strong, but "sweet and smooth" guidance. The teacher is putting into practice the technique of providing scaffolding[1] in a context of reciprocal teaching[2], specifically designed to sort out pupils from an impasse. The teacher leads the children in the learning process, through continuous stimulation with questions finally letting them do things "alone" in a non-hierarchical environment of reciprocity.

Checking the mail

T: *Who's starting today? Let C. have a go. See if you can remember what to do.*
T: *H., can you help C. She's a bit stuck. What do we do next?... Tell her, don't do it for her*

Everyone gets stuck.

T: *It's this one, click on Connect...What's it doing now? What does it say?*
B: *It's dialling a number.*
T: *Can you hear it*?
C: *Very quietly. One sound...*

1 J.S. Brown & K. Van Lehn, "Repair theory. A generative theory of bugs in procedural skills", Cognitive Science, 4, 1980, pp. 379-426.

2 A. Collins, J.S. Brown, & S.E. Newman, "Cognitive apprenticeship: teaching the craft of reading, writing, and mathematics". In L B. Resnick (Eds.), Knowing, learning and instruction: essays in honour of Robert Glaser. Hillsdale, NJ: Lawrence Earlbaum Associates, 1987.

T: *What do we do now? We shrink the top. This is a tricky bit. (She helps.) What now?*
B: *Click N* (Netscape icon).
T: *Let H. do the next bit. What now? Do you remember?*
...

In the next example from another primary school, we see two children helping each other. The teacher chooses not to intervene. We observed many examples of this type at primary school level, in which the children manage to negotiate according to each one's ability and "naturally" find ways to exploit their complementarity. They express their individuality, but in relation to the needs and characteristics of the group.

Writing a letter: helping each other

E. and D. write a letter introducing themselves. Teacher leaves them to get on with it. E. types, D. holds the mouse. E. has problems with pressing the keyboard lightly enough — the letters keep repeating. D. is very patient, and manages the process. They work together slowly but well.

E. types: *“ Our names are D. and E. ”*
D: *Don't press the buttons so hard... We can't tell them the weather is wonderful!*
E: *It is getting worse!*

E. has difficulty with spelling, but is quick to find letters on the keyboard. D. dictates letter by letter. He finds a new way to help E. with the double letter problem — he uses the mouse to spell-check and correct word by word — RAINNY to RAINY.
Now they've made a start they will save on disk and finish the letter later in class as there's something else to be done now.

What do children and pupils think of teamwork? In most of the interviews we did with them, most told us they were happy about working in teams. Exchange is important to them: *“ I prefer to work in teams, because it is not an individual work; that is, we must, each one must, express ideas and then exchange them with classmates ”* (interview with N., ten years old). And the sense of responsibility is also rewarding: “ *Working in teams is far better, because we have the right to explain to anyone who doesn't understand ”, (*interview with E., ten years old). Other children frequently show good awareness of the positive and negative aspects of collaboration: the possibility of changing roles now and then, but also sometimes being "coupled" drags two unequal participants into mutual "dysfunction". *“ When you are two, it is much more fun; when you are alone you concentrate better. When you are two you have many more ideas ”*.

There are, however, some exceptions: a child in a class working with a contract-based approach, that is organised in small sub-teams expresses his dissent: *“ Working in a workshop: I really don't like it, because when you are in a team when each one is doing something different, I feel absolutely alone. ”* Others evoke problems of competition within the team, which make them prefer individual work. This choice seems, however, very much related with the model conveyed by school: it is much more frequent in secondary schools, where individual work is still the rule and also the basis on which to assess the pupils.

The individuation process championed by traditional schooling was based solely on the assessment of individual performances; it translated and reproduced a vision of the world based on the "individualisation of everyone". The individuation process championed by ICT in school has to rely, often for organisational and logistical reasons, also on a capacity of the individual to contribute to collective goals. It remains to be seen what vision of the world this new division of labour entails.

v

“ I do riting on mi kommputor it ets elektrisity ”

(A child in primary school)

3.2 Learning to learn

3.2.1 From digital to analog learning

In the previous chapter, we contrasted "learning to learn" with "stocking contents". To develop the idea more analytically, we would like to draw from Bateson's contrast between "analog" and "digital" coding[1] and apply it to the concept of learning. By "digital learning", we mean the acquisition (the "stocking") of bits of information. Finite sets, or packages, are transferred from one to another "container". Inventories of the "contents" of such warehouses can be drawn regularly: knowledge is a matter of being "in stock" or not. When it is not, it can be ordered and transferred by mediators (teachers, book, cassettes...) to the "learners". This form of knowledge is highly valued in traditional educational systems, where the emphasis is essentially placed on the learner's ability to "recognise" and reproduce faithfully the information transmitted.

With the evolution of pedagogy, there has been a shift towards a growing relevance of what we would like to call *analog learning*. Analog learning is to transformation what digital learning is to reproduction. Transformations are made from one to another domain by a junior learner with the help of another learner — students and teachers are seen as members of the same learning community. Analog learning refers to certain dispositions to analyse, combine and deploy, to certain abilities to create and innovate. In other words, analog learning is a process of learning to learn: learning is seen as a generative, transformational process based on loops, jumps, cross-hybridations. Images, paradoxes, riddles are used — like in poetry, which may be seen as the ultimate form of analog learning. Needless to say, but let us be clear, *we* have a certain fondness for this form of learning.

Computers can be used to inculcate both digital learning and analog learning. When they are used to transfer information from one repository (the teacher, the programme author, the web site...), they may be said to be used digitally. When computers are used to generate new possibilities for the pupils to participate in the process of knowledge production, they may be said to be used analogically. In some of the experiences we observed, teachers are adventuring on the difficult path of fostering analog learning. In some other experiences, however, the curriculum is still very content-oriented: even procedures (for instance, for operating computers) are divided into small sequences, each one sanctioned by a certification. In this way, procedures are finally assimilated to "contents" that children should acquire. The process becomes a subject matter, as opposed to a potentially creative tool.

When A. was saying that *“ Children are not hollow containers in which to pour some information, and then shake them to see if they make bubbles… ”*[2], she was precisely putting the emphasis on the need to provide them with capacities for combinations and transformations, so that they can develop autonomous ways of appropriating knowledge. In other words, she was emphasising *process* as opposed to *content*. Many teachers were aware of the important role they have to play in order to ensure that computers do not become another tool reinforcing a passive attitude among children. As P., a teacher in a primary school, points out:

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1 G. Bateson, "The Logical Categories of Learning and Communication", in Steps to An Ecology of Mind, New York, Chandler, 1972, pp. 250-279.

2 See previous chapter.

> *… in front of a computer children can be very passive. Not only in front of a computer, by the way, in front of many more things. Letting them use computers, encouraging passivity, would not have been a very unpopular strategy with them! In activities with computers, what really counts and has a pedagogical value is planning the activities. It is having children understand that to achieve a good result, it is necessary to have a project, and to proceed with the project step by step. That is what gives them reward, the feeling that the result is the fruit of their own work.*

The emphasis placed on process rather than on content makes the assessment of learning more intangible, less "spectacular". Two primary school teachers pointed out that this aspect is sometimes misunderstood by parents: *" It is sometimes so difficult to make parents understand that what we want to give their children is the curiosity and the pleasure of learning, and then some tools they will carry with them all through their lives. "* Parents are often more concerned with contents and notions, and would like their children to devour (and produce) page after page. What counts for most parents is often the quantity of production (and the quantified assessment of the ability of the child to reproduce it). The processes mobilised by the learner are little-valued.

Focusing on the need for children to master processes changes completely the way the teacher relates to the curriculum. This is particularly true in those countries in which the curriculum is based more on the consumption of a certain amount of "subjects" by pupils and students; that is, at the end of the day, on the consumption of a certain amount of pages. Placing emphasis on process frees teachers from the recurrent anxiety expressed in terms of "Oh Lord! I have not yet done the fourth Independence War, and it is May already!" It shifts the paradigm onto the learners' needs in terms of pace, time, support, as opposed to the administrative task of accomplishing a programme.

It is difficult, from our observations, to assess the impact of the process-oriented approach on the children's learning. It seems, however, that at least it transmits a certain pleasure in the construction of an activity, as the children involved in the project of the "Turtle"[1] told us about their preferences as to the school activities. "Projects" were their favourite thing. By "projects", they meant the different steps of the "Turtle" activities, and not only working in front of the screen with the application of Logowriter.

3.2.2 Reframing errors

Computers can contribute a new status to error and to create a new relationship between teachers and children. Errors may become less and less the red mark making one's exercise book or test sheet "dirty", less and less a source of punishment, or a stigmatisation of one's own personal value. Furthermore, error cannot be framed as a prerogative of learners anymore; it can also lie on the teacher's side. And the teacher can use it as a pedagogical tool, as the following exchange shows.

> ***Sending a message***
>
> Children then find "Send" instruction. Trouble with mouse, click wrong thing, then teacher clicks "undo"
>
> T: *Look what it's done!*
>
> Children look. One says: *It took off our names!* Much laughing.

1 See chapter 2.1.2

T: *Did I click the right button?*
All: *No!*
T: *I made a mistake. What did we learn?*
B: *Not to undo.*
T: *What do we have to be with the mouse?*
All: *Be careful!*

As we once observed, two girls from primary school made a mistake in the procedure at a computer and lost all their work. Not only that, they continued to ignore the suggestions given by the teacher. The teacher nevertheless adopted a very loose form of control, let them go on and, instead of "punishing" them for their behaviour, underscored their mistake with humour. In other cases, we observed that the teachers' commentary tended to seek out ways to reinforce children, stressing the positive aspects of their performance, rather than discouraging them.

The activities developed at a computer and with e-mail can help reduce children's anxiety about their performance, their fear of the stigma of mistakes, of red marks. Computers seem to have for children a reassuring function and can be used by teachers with this in mind. As some children pointed out, the ability to delete their mistakes, to modify the text as much as they want before printing it, is extremely important for them. And so is the neat quality of the output. As a teacher told us, *" This can improve their self-confidence. At the end of the day, it facilitates the expression of their creativity "*.

The following story illustrates this aspect[1].

No fear of mistakes: the story of L. and E.

L. is ten years old. Very calm and mature for her age. She has very big glasses and no particular appeal, especially for the boys in the class, who usually ignore her. She is a very generous child, always available for help. She has always been shy and insecure.

But in front of a computer, she is perfectly at ease: she is confident in her movements, and in operating the machine, although she is one of the few in the class who does not have a computer at home. It is she that classmates ask for help, or it is she who spontaneously takes the initiative to help them, whenever she feels they have a problem in front of the machine. She does it lightly, gracefully, gently teasing them sometimes, but never with pride or arrogance.

Before computers were integrated in class activities, L. was not very popular in the class. But once everybody realised her great skills, superior to all her mates', she was able to change the relationship she had with the rest of the class. Her status has completely changed and she feels much more at ease in the relationships with her classmates. Her teacher remarks:

" She was completely blocked by her mistakes when they were on a piece of paper because they were there, visible, and that was a problem. She refused to continue working, mortified. Her general attitude was so reserved, waiting for confirmation from anybody! But in front of mistakes at a computer, which can be cancelled, swept away, she has done incredible work. "

1 The story recalls an episode reported by S. Turkle of a girl who systematically refused to write anything, because she was ashamed of her hand-writing and of the mistakes in her exercise book. But when she was allowed to use a computer, she started writing beautiful poems, because there was no longer any trace of her mistakes and the letters were neat. See S. Turkle, The Second Self, Granada Publishing Ltd., London, 1984.

> E., a brilliant ten year-old student, is at the computer, writing an e-mail to her correspondent in the UK. In these exchanges, both correspondents have the choice of writing in their native language. But today E. becomes bold and decides to try English. She writes a word and deletes it. She takes her English book, seeks inspiration and writes: "Dear..., how are you?" Then she deletes it. She writes it again. And adds: "I am fine". Then she deletes the whole sentence. She re-starts in her own language. She modifies the structure of the sentences, cuts and pastes (helped by L., her classmate, upon her invitation), changes the words, until she is satisfied with the result.

The dramatisation of mistakes brought about by the traditional ritual of assessment and correction can have a blocking effect on children, because it can be felt as a judgement on them as persons, rather than on their accidental performance. Computers may become a safe place where overcoming mistakes is simple. It is no more a problem of good or bad. It is a problem of being or not being in control[1]. Children can build their own strategies to be in control, without the anxiety of an external judgement. This contributes to increase children's self-esteem, and self-esteem contributes to release their creativity and improve their performance.

This analysis is confirmed by some of the teachers we interviewed:

> *There are certainly children who "surprisingly" acquired an outstanding capacity to carry out projects. Children who were performing at a low-average level in other logical-mathematical abilities and who enjoyed a gain in the activities at the computer... I do believe it largely depends on easiness of overcoming errors and leaving no trace of them.*

This opinion is reinforced by a secondary school teacher:

> *The machine is patient with them. It does not blame them when they make mistakes... as I, a teacher, sometimes do, as my colleagues do. Children can try again, that is all. They are relaxed about it. Take the programme we are using for mathematics and geometry... If I had it in my time, I would not have developed all this aversion for mathematics and geometry! With the programme, you try and retry. There is a certain difference between " If it is wrong, you have to start all over again " (which was the case with paper, pencil and ruler) and " If it is wrong, you just correct it! ".*

When computers are used in order to foster analog learning, mistakes at the computer are not mistakes anymore. They are steps in a permanent process of learning to learn. Computers do not reduce anxiety or increase self-esteem out of their very nature. It all depends on the teacher's framing. When teachers understand that computers can lead pupils not only to master information transfer within one given context, but also to lead them to generate new learning contexts, then computers may become very influential sources of change.

The emphasis on the positive exploitation of mistakes, as well as on autonomy and collaboration, entails the question of teachers' trust of children and students. The pedagogical paradigm shift, placing the learner at the core of the system, profoundly modifies the relationship of mutual reliance. Granting learners autonomy, giving up the central role of unique reference for the class and depository of knowledge on the part of the teacher, encouraging

1 See the analysis by S. Turkle in The Second Self, op.cit., p.142-148.

collaboration among peers, giving a new status to error: all these changes both require and lead to the establishment of a new relation of trust between teachers and their pupils.

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3.3 Contexts of control and trust

3.3.1 Norms and trust

In the experiences we observed, the new status of the relationship between teachers and children was in some cases perfectly understood and managed. But a trustful relationship between teachers and children may also depend on the institutional environment and on the margins of freedom given to teachers to develop such a relationship. There are environments which put pressures upon teachers to keep an attitude of distance from children: this distance can translate into either repressive or patronising attitudes by teachers *vis-à-vis* children. However, we also ran into cases not necessarily dependent upon the environment, in which the teacher seemed insecure about losing the position of control traditionally granted. We met, for instance, a teacher in secondary school who kept control of the circuit breaker which allowed the computers to function, so that he could be sure that none of the pupils could start to use the computers before he had finished talking. Perhaps apparently insignificant actions such as these, easily overlooked, have significance in their specific context. If the issue of power relations is particularly sensitive in that classroom, we can presume that the simple fact of controlling the circuit breaker bears a presumption (on the part of the teacher) of guilt (on the part of the learner), which is not without consequence in the teacher/pupil relationship.

But it is not a matter of actions only. Wording, even when apparently technical and neutral, can bear a potential for undermining mutual trust. Let's make an example. In a way, there is an analogy with juridical systems: one of the most common foundations of criminal law is the presumption of innocence unless the State, through the Court, proves the contrary. However, it is also very common that in spite of this principle, norms are often formulated in the language of repression, implicitly suggesting a presumption of guilt by the "defendant". It is then no surprise if the founding principle of presumption of innocence is turned away in practice, and people find themselves obliged constantly to prove their innocence before the juridical authority.

Symmetrically, the language in a prescription of rules to be followed by pupils is not neutral. In some of the cases we observed, the norms regulating access to the Internet, for example, were formulated in a typical "legalistic way", authoritarian and with sanctions included.

What we are questioning here is not the need to set up clear regulations for pupils to access the Internet. The issue is so culturally bound that there is not one single approach that could be valid for all cultural contexts. We are aware that allowing young people free access to the Internet is a complex and difficult matter. Besides questions of responsibility, maturity and cost, there are also legal issues, which are particularly sensitive in certain countries, and schools need to protect themselves. In some countries, if a young person uses the Internet illegally at school, the school may be held legally responsible. This partly explains why some schools we observed tried to avoid misuse by rationing access. One had even negotiated a policy for access at the level of school governors, which will both protect the school and create a framework within which pupils may use on-line facilities at will. This measure is also grounded in the goal of ensuring equitable access to all children: rules as a guarantee for equitable access. But the way in which some of the prescriptions are formulated betrays a rather top-down approach in the establishment of those rules.

The real issue at stake here is how these regulations and norms are formulated and what type of agreement is negotiated with pupils. We will return on this point later in the report. But it is important to draw attention to this question here, because certain formulations seem to reveal an *a priori* judgement of guilt on the pupils' side. And this is by no means without effect on how the children perceive school and their relationship to it. One could also argue that this presumption of guilt can be in some cases very conducive of "illegal behaviour".

School systems, especially in certain countries, had traditionally been based on the presumption of guilt: children were viewed essentially as forces of nature that should be subjected to discipline. Of all the possible forms that school could have taken, it was this one that was chosen: physical discipline (e.g., long periods without moving), tests done as far as possible in "isolation", marks intended as sanctions (either positive or negative) rather than assessment in the interest of the child... even to the point of considering legitimate actual corporal punishment. We are not talking of centuries ago, just few decades ago. Sensitivities have changed, sooner or later and to different extents, in all countries. Education did put aside its repressive philosophy and methods, as the focus shifted to individual rights and children's development (perhaps, more firmly and coherently at the primary level, still with some dysfunction at the secondary level). Some residues of that age, however, still persist: tests, for instance, have not always changed in practice, in spite of the fact that an explicit reconsideration of their function has been ratified by most school systems.

The following story of an assessment test in a secondary school seems very interesting to us, because it shows that different registers of trust and mistrust can coexist even with the same teacher in relation to the same classroom. The discriminating element was, in this case, the computer. In the case of the traditional activity of assessment of certain abilities/contents (math, in this case) with pen and paper, profession of mistrust seems to remain the rule. On the contrary, when the same assessment is carried out at the computer, the prevention and retributive measures are no longer applied. The story raises the critical question of the status of pedagogical evaluation, when computers are involved.

The habit of lack of trust and the perturbing element

The class enters the computer lab noisily, while the teacher of mathematics unexpectedly announces that the first 20 minutes will be occupied by a mathematics test. A large group of children rush to the back rows. They all sit down. In the last two rows, there is an abnormal concentration of girls. The teacher asks them to space themselves out better. "Go to the front rows, it is not group work!" The whole process of rearranging takes quite a long time. Finally, the teacher declares herself satisfied. "I love to come to the lab to have you do your tests. In your classroom, it is impossible to put you so far from one another" — she grins with a somewhat sadistic smile. Fabrizio (13 years old) whispers to O., the teacher in charge of the lab: *" So, we will be able to exchange answers with one another through e-mail! "* O., who is always present in the lab while the other teachers come for their own activities, laughs very amused.

In the meantime four or five students from another class erupt noisily into the lab. It is a common, uncensored, habit. But the teacher chases them out with a "SHHT! SHHT!" This is very unusual indeed: in the lab, there is no obligation of silence whatsoever. Then, while the math teacher is distributing the test, another teacher comes in, talking loudly... "SHHT!" "Oh, I am sorry!" ... and she runs away.

Silence reigns, like in a church. Sudden memory of old school days... The children have started their test. Meanwhile, the teacher in charge of the lab works on something else at the computer. The math teacher walks around. Whenever she turns her back on someone, a funny effervescence starts: imperceptible movements of chairs approaching their neighbours, children whispering as if they had to transmit a military secret... The teacher comes up to me and asks me about my research. It is an extraordinary chance for the whole class to intensify their difficult attempts at exchanges. The child next to me looks paralysed by fear, turns his head almost imperceptibly towards Fabrizio, his neighbour, but he's

> sitting too far away. Another boy, Francesco Paolo, *the* outstanding student, looks at ease. He has finished his test well in advance and he's mumbling a dialogue to himself and to his sheet of paper. Then he stands up and goes to the math teacher to show what he has done. "It seems to me it is very good!" The teacher nods very proudly. Following his example, another boy, Riccardo, goes to the teacher to show her his work, which is not finished yet. "I don't know, I don't know" — the teacher says to him, meaning "you have to do it alone!" Riccardo goes back to his seat looking disappointed.
>
> At the back of the classroom there are frantic exchanges of rulers. The teacher looks in that direction, and one of the children, with a guilty and frightened expression, waves a ruler, as a sign of innocence.
>
> "Doing a mathematical test on paper, having a computer in front of you and not being allowed to use it, it is pure sadism!" — O. jokes rather loudly. The teacher ignores his comment.
>
> "I'll give you only five more minutes" — the teacher threatens. "For me it is fine" — the outstanding student Francesco Paolo. whispers to himself. Fabrizio has finished too. In the last row, when the teacher turns her back, one girl actually goes up to her neighbour and starts copying the answers. The risk is high, but in the end, they become more intrepid!
>
> Riccardo, the student disappointed by the teacher's answer, has finally decided to write an e-mail to a friend of his, instead of doing his test. The time is over. The teacher starts to collect the tests from the back. In the first row, a girl passes her answers to her neighbour, a boy, who starts writing frantically on his sheet of paper. The teacher doesn't see, or maybe pretends not to see.
>
> "Okay. Now, you can check at the computer whether you have done your test well", the teacher says. The children redistribute themselves in the classroom two by two, girl with girl and boy with boy, with very few exceptions. The noise level increases and reaches the usual standards for the lab. Children start working together, discussing, confronting their results. For this teacher, the computer obviously has the power to change the rules.

This story illustrates a case of distrust *vis-à-vis* children on the teacher's part more as a habit. It seems more a part of a consolidated ritual rooted in "traditional" activities than the manifestation of negative feelings. To lose this habit, on the part of the teacher, would require a pedagogical and organisational revolution. She has only undertaken this revolution half-way: she proves she understands the value of collaborative learning and of children's self-assessment, as opposed to the centralised evaluation of individual abilities through "police-like" methods. That is why she encourages them to check their work immediately afterward at the computer and work in small sub-teams, autonomously decided upon by the children. Here she shows she is somewhat ready to trust them. That is also why she exercises a form of intermittent control during the traditional test: I-see-you-are-cheating-and-I-threaten, I-see-you-are-cheating-and-I-pretend-not-to-see. It is as if the ritual of control through "terror" has lost some of its value, after all, but pushing the consequences of this consideration to its end would be too disruptive of the pre-established order.

3.3.2 Teachers' trust and pupils' self-confidence

We would now like to tackle the question of trust from another angle: that of building up the pupils' self-confidence. As for autonomy, which is strictly linked to pupils' self-confidence, organising the conditions to develop the pupils' self-confidence requires the affirmative initiative of the teacher, as well as institutional good will. The more so the younger the pupils. The techniques to build it up vary deeply from one school to another, the cultural element being an important factor in the choice of approach. But also the social conditions of the environment, the fact of being protected or less protected from the social point of view, seem to play a part in determining the strategies to organise the settings necessary for the development of children's self-confidence. The more stable the environment, the looser, or maybe the less-visible, the strategy seems to be.

In the exchanges and examples reported in the previous chapters, we can already get a flavour of the different approaches possible. If we look again from a different perspective at the exchange between the teacher and some children aged from five to seven, presented in chapter 3.1.2 (*Checking the mail*), we can see that the attitude of the teacher is that of continuously reassuring the children. She stimulates their initiatives and rewards them through continuous participation and attention. She gives immediate positive feedback to their action, too. The teacher wants them to feel she "is there". This primary school is in a difficult socio-economic area, and this might partly motivate the reassuring behaviour of the teacher, providing a safe frame to the experience.

Other teachers tried other roles, less participative and directive, but in the same perspective of enhancing children's self-confidence. Another example already presented in Chapter 3.1.1 (*Pupil-teacher-machine interaction in text-writing: a multi-layer approach*) illustrates this point. In that interaction, the teacher leaves the student working on his text and intervenes only here and there to stimulate new improvements. Sometimes spontaneously, sometimes upon the student's invitation, never to disapprove, but rather with some "loose" advice and explicit rewards for the students' progress.

In other situations, notably when the school is in a socially secure and culturally homogeneous environment, we came across different strategies aiming at enhancing the pupils' self-confidence. In a school, "ironic" verbal and non-verbal registers could be used as common means for reassurance. The fact of making this communication register acceptable in the school context, whether it comes from the teacher or from the children, creates a "familiar" environment, in which the *ludic* (playful) dimension acts as a factor for establishing confidence. Of course, the question of language registers in different cultures would deserve more investigation, but can only be touched up here since a deeper analysis goes beyond the scope of Mailbox.

v

“ C'est du jeu parce que tu te marres et du travail parce qu'il y a de l’orthographe. ”

(A child in primary school)

3.4 Pleasure as a serious matter

3.4.1 The ambiguous status of pleasure at school

Most pupils and students do have pleasure working with the computer. It is a well-documented, easily observable fact. As a matter of fact, the promotional discourse on ICT does not hesitate to include this argument as one of the assets which should convince the last reluctant teacher (parent) to be converted. "Children LOVE computers, that is why they LEARN so much more". For once, we would even happily agree with one of the pillars of the promotional discourse. Unfortunately, very little reflection is developed on the status of pleasure in school. School is still largely associated with work. The status of pleasure in school is still ambiguous, especially in some cultures. The more so the older the pupils. In several languages, the word "work" itself implies a notion of exertion, effort, "sweat". Is it then legitimate to have fun while working? Or, let us formulate it this way: if one has fun, can we still speak of work? This ambiguity sometimes makes the implementation of ICT in school an amorphous, anecdotal experience: ICT is there as an optional or recreational activity, but it is not *real work*. In the best cases (among these hesitant — or compromising — choices), computers sit in a *zona franca* (free zone), in which the usual school rules do not apply.

This ambiguity is not only in the teacher's mind. Children and students seem also to characterise pleasure as something more linked to games than to work. Very young children shift without distinction between "playing with a computer" and "working with a computer". When asked more specifically to choose a definition, they often hesitate and say: "Well, it is work, BUT it is fun!" In fact, they perceive it is neither one nor the other and grant activities at a computer a special status:

- *Non, ce n’est pas du travail! Autrement on ne correspondrait pas... on n’est pas obligé de le faire.*
- *Un peu les deux. Un divertissement sans en être un. C'est moins sérieux...*
- *C’est du français, mais plus sympa en correspondance que faire des fiches.*
- *Les deux! On le prend pour un jeu, puis après on s'aperçoit que ça nous fait aussi travailler.*

Older children place computer-based activities half-way between work and play: *“ It is like free time, it doesn't fit with school ”*. One teacher thinks that, independently of the tool (and place) it is also the content of messages *“ at the blurred boundaries between school and private life ”* that distinguishes the use of ICT from other school activities.

There are children, however, who expressly deny the status of play to computer-based activities. This was the case with some children using the Internet for their project. One of them was searching for information about a German football player. Another was trying to find out something about the film "Star Wars". One found pictures of a Ferrari to be used in the project. He said he could not find anything about Ferrari in the school library... In spite of the variety and scarcely academic nature of their interests, children feel they are *not* playing around in front of the screen. But one can maybe understand the fact that because children affirm this, it is not in itself sufficient to remove the ambiguity of the status of these activities in the eyes of the teacher, or of most adults. An entirely new reconsideration of what is culture and what culture is "legitimate" in school would be necessary.

If teachers feel that an activity is not serious, they may sometimes undervalue it. We have come across teachers who believe that children browse or search the Internet as a pretext to chatting among themselves... and chatting-is-not-working-and-therefore-is-not-learning-and-therefore-should-stay-out-of-school: *“ When I see a child with a precise task to achieve, I would spontaneously think s/he has to do it alone. If they are talking together, I cannot prevent myself from considering it as just gossip. And it makes me feel anxious about what they are learning ”* — a primary school teacher says.

We also met teachers, however, who knowingly use enjoyment as a powerful lever for pupils' motivation to learn, and who encourage them to undertake non-conformist activities. Sometimes they can do so only by establishing a special frame within which to develop them. The special moment in which the activities take place, the equipment (an important fetish of modernity) and the place (a lab, another classroom, or a special configuration of the usual classroom), contribute to change the usual framework of experience and facilitate the "loosening of censorship". In some of the secondary schools, especially, the computer lab, even when reserved for a single class at a time, seems to have the function of a meeting point. It is not uncommon for some children from other classrooms to pop in every now and then, to ask for advice from the teacher in charge, or to ask if they can print, or make an appointment. Other teachers with a "free hour" may come in and usually discuss with the teacher in charge some plans for some activity. The lab is a sort of "free zone", in which rules are not the same as in classrooms: one can freely move, or talk loudly.

But, to what extent is this free space still perceived as *school*? Opinions seem to diverge. In one secondary school, most of the activities around computers and electronic communications were conceived as games and/or competitions. Literary productions, enhancing linguistic and semiotic skills, mathematical games: all are developed in competition with other schools belonging to the local network. Every week the list of winners is published on the network and prizes are distributed (books!). Teachers take advantage of the competitive attitude of children to stimulate them in the production of texts. Not all the teachers are unanimous, however, in attributing equal value to these activities *vis-à-vis* "traditional" ones. In one case, for instance, a child who was usually considered a low achiever, won a competition for text production. One of her teachers, judging computer-based activities as an extravagant gadget for the school, commented: *“ It doesn't really count because it was done on the computer ”.*

Emphasising the contrast to ordinary class activity is a way to give a certain legitimacy to new learning approaches based on special learning contracts, in which pleasure can acquire status and become a tool for motivation. One primary teacher deliberately and explicitly gave particular status to e-mail exchanges. At the beginning of the year, she presented it *“ not as a choice, but as a chance ”*. But this teacher is also well-aware that she has to play a role in maintaining the children's motivation for the activity.

Another way of stimulating the integration of computer-based activities in school is using "sitting at computers" as a reward for accomplished work. As S., a pupil in primary school, reveals, she has *“ a lot of pleasure using it. We have the right to use it only when we have finished our work because the work is the most important thing ”.*

But pleasure is not only a lever for motivation and learning, but can also become a goal in itself, a condition that children need to acquire to enhance their self-expression and creativity. In certain classes we observed, pleasure was a specific objective, because it was seen as a stress-diminishing and "liberating" factor, which stimulates — a teacher told us — a *“ positive anxiety, rather than a self-destructive one ”,* enhancing children's performance. In these schools, however, the global pedagogical approach is *ludic* and computers are just an additional tool for activities integrated into the curriculum.

3.4.2 Neat machines, transgressive machines

Yes, pupils do get pleasure from using computers. We have observed many pupils staying after the bell rings, at breaks and after school. The computer, partly because of its characteristic of "intelligent pseudo-partner", partly because of the aids it provides to work, concentrates and stimulates pupils' activity. One asks the computer if it has any messages, the computer looks after retrieving addresses, it writes in a readable fashion, it tells you when you have made a mistake. Symbolically, the computer seems to be able to provide some part of the personal attention that a pupil needs. This can be the case also and especially for disturbed children or for those who have serious learning difficulties. To this can be added the attraction of the "gadget", its status, its speed, its ability to operate across distance. Being able to control the machine is also an important source of satisfaction. Through mastering this technology, pupils can often set themselves apart from parents and old-fashioned teachers, as well as reassure themselves about their own future.

The pleasure children derive from using computers should be differentiated from the pleasure teenagers might draw. Small children frequently demonstrate an unmediated fascination for the object itself because they perceive it as an animated object, while adolescents seem to draw their fascination from the increased abilities to perform tasks that the machine allows them. As one teacher pointed out, young children seem to derive pleasure from the simple tactile feeling of contact with the machine: *" They love the sensual rapport with the keyboard "*. In the interviews children confirm that they enjoy that direct and solitary relationship. But what appears even more clearly is the attribution to computers of animated qualities. Sometimes, children cannot explain to themselves how come there is not a human being inside the machine.

Both primary and secondary school pupils like the ease and immediacy of operations (deleting, shifting paragraphs, adding words). And all this happens without leaving a trace. The result is neat. The comment about the "neat writing" that children can produce out of their manipulation of their machine came up again and again in our discussions. The very term "manipulation" is used here on purpose because we need to stress that "hands" are indeed crucial in the relationship children develop with computers. (*" It's fun using your hands "*). It seems like it is not so much a dialogue between a brain and a brain but an intimate physical relationship between two bodies. When children comment about the power they exercise over computers, the pleasure is as much cognitive and intellectual (due to the immediacy of the response of the machine to the children's intention) as physical and sensual (related to the neatness of the printing, for instance, or the very sleek beauty of the machines, be they computers, printers, or accessories like the "mouse").

This dimension appears also in what older pupils told us:

> *When we have finished the work, if we manage to finish it before the end of the hour, we are a bit proud... because it is a different thing, let's say, from what we usually do. Usually we write on, well, you know… the printer… I like the printer… I like seeing the drawing that we made reproduced on the printer sheet… And it is also clean. And then I am proud if someone looks at my "computer science" exercise book I mean, if I did it well and somebody looks at the computer science exercise book, I am proud, because the computer, I think, makes good drawings.*
>
> *I think, that when one then learns how to use it, it is very beautiful, because you feel you are... you feel you can do all you want with that machine, you are sure it does not make mistakes, so, and then you can do what you want. I don't know… Even if you give it (her?)*[1] *small orders, it (she?) always does it… If you give it (her?) a right order, it (she?) does it right, and it (she?) doesn't complain (laughing) ... It is not like older brothers... It gives you a sense of power...*
>
> *Well, the difference it makes [to produce a text on computer, and on paper] I think it is enormous because, in the exercise book, it is a normal text that anybody can write, but, instead, when it is written on a computer, it is, yes, the same text, but it has something more… you feel that you have done cleaner work... It is as though you could even show it to the President of the Republic!*

These children (who happen to be 11 years old) show pride when they display for others the results of their activity. For them, it is also very important to have the feeling of controlling the machine, the "sense of power" which derives from it. This element is more present in teenagers than in young children.

For adolescents, computers seem to have a more instrumental nature: they like it because it allows them to do more and more quickly. They also appreciate the relational potential allowed by the machine. First of all, the object mediates the relationships that they entertain among themselves. They get together in order to browse the Internet. Computers are an informal topic

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[1] In the original language, it is impossible to distinguish between a neutral and a female name.

among friends, or a subject to raise in conversation just before class starts. The Internet also gives a pretext for home gatherings: schoolmates meet at somebody's house, to go and see what an Internet search is like. Sometimes the meeting point becomes school itself, in after-hours. Some pupils, even if they have an Internet connection at home, prefer to go to the Internet Club at school. They say it is because they like doing work on the school home pages with other people, they like the social element of surfing together, often they end up looking at finding things they might not find alone. They also like to become familiar with different types of computer.

Secondly, the pleasure may come from a socially shared transgression *vis-à-vis* classical prohibitions. The following excerpt deals with a delicate theme, which may be particularly sensitive for certain people and in certain countries. The sensitivity of the theme resides also in the fact that it could constitute a contra-argument for the Internet: its "dangers" are precisely invoked by its detractors as a valid reason not to introduce it in schools. We prefer not to enter this debate. It is of the type which has traditionally accompanied all innovation, without affecting at any extent, at our knowledge, people's appropriation of the new object (both from the conceptual and from the material point of view).

> ***Transgression***
>
> One boy sitting at the PC all the time was browsing for material about football. His friend had just been told off by the teacher because he had loaded down pictures from the net and thus taken the job away from the photographer in the team[1]. The boys gathered around the pupil(s) that found football heroes.
>
> Great gathering again. Laughing. What's going on? The teacher was safely standing on the other side of the room. He was not observing that two boys were looking up a porn magazine and inviting everybody to see. When the teacher was on his way to find out why so many were standing there, they quickly changed the picture back to what they were supposed to look at, nicer pages. The teacher was too late this time. Nobody told him either.

Sex exploration is a common activity for adolescents. But in this case, it does not even seem to be at issue. The real object of satisfaction does not seem to be the picture itself (one does not need to "surf the Internet" to stumble upon these icons), but the fact that these boys found something they are not supposed to find *at school*. That seems indeed to be the real satisfaction. Transgression derives from breaking a very strong implicit rule and the Internet offered just one of the many possible tools to that end. Although, probably, a more conducive and an easier one.

The pleasure that derives from computer activities can be associated with more explicitly "erotic" connotations: e-mail, and especially IRC, can provide the opportunity for teen-agers to undertake games akin to seduction. The following story suggests that sexual concerns may surface on the screen, which in turn operates as a protection from any real life consequence of the dialogues. It is precisely the protection provided by the screen that encourages the exploration of different identities, perceived either very close or very far from one's own. On the Net, identities are fluid and multiple. Playing with them can bring pleasure, but has often only one "serious" consequence: the adolescent is offered an opportunity to explore and gain a deeper understanding of her/his own identity, and in the long term, of the concept of identity

1 The pupils were 9 years old and working on a inter-disciplinary project in lower secondary school. They were making a newspaper about "Europe" using Internet as one of the main sources for finding information. The 58 pupils were free to make articles about what ever interested them but the editor in each group had to a certain extend to agree on the topics.

itself.[1] The debate on whether these concerns are legitimately dealt with in school remains, of course, open, and is too related to culturally different perceptions for *us* to express *our* opinion.

Pseudonyms, changing identity

The pupils we interviewed, who were 15/16 years old, worked on the topic of prostitution in the framework of a research project for their course on Sex and Health (in a National curriculum for the 8th grade)[2]; they wanted to contact people in society who could give them information about the subject. One of their ideas was to use the Internet as a means of getting into contact with prostitutes and pimps.

In the framework of the project, Ti. used different names from time to time. Ma. doesn't remember because it's been a long time since she tried the IRC. One of the girls and her project team tried to chat on the IRC under the name "Hotlips". By using the nickname they hoped that they would reach somebody who used the Internet for buying and selling sex. They wanted to find out how this business worked. M. used the nickname "Pamela" and many people wanted to chat with her. *" If you want to chat with many people, just call yourself a female name "*. M. told us that some people ask how old you are and where you come from. When they hear how young the pupils are they quit the chat. R. refers to many chats with men about 27 years old, coming from ***, asking: "Do you want to go out with me?" They must be struggling in life, R. said. She thinks a lot of people make passes at others, especially at those who have female names. K. said that he is kicking people out of channels, thinking that it is cool to try to take over the channel.

We will return to the topic of pleasures offered by computers when we discuss the issues raised by "enchantment": perhaps we could say that, similar to behaviours displayed during Carnival, the interactions conducted through the computer screen have a different social impact from that which they would have outside the protection of that frame.

V

1 S. Turkle has widely and deeply explored this question in her book Life on the screen, op. cit.

2 The project explored themes and objectives in the National Core Curriculum for basic education stated in the curriculum for Social Studies grades 7-9. The curriculum defines under the heading "The individual, the family and society" content issues pupils are supposed to work with; "... Child abuse; incest...Sex roles and equality between the sexes, sexuality. HIV-infection, AIDS. Pornography. Alcohol and drug problems." In addition the pupils trained themselves in using a central working method in the curriculum: project work. "Steps should be taken which help the pupils to learn how to find information for themselves, and at the same time learn from others. The teaching should train them to work on their own, in groups, and on projects".

V: “ *Well... I learn many things and then, it seems that the computer talks to me.*
Int: *Do you feel as if there was someone inside?*
V: *Yes, since I was a little child, I have thought there was someone inside* (laughing).
Int: *And now, what do you think?*
V: *Nobody has ever told me if there is someone...*
Int: *You don't know, then?*
V: *No, I don't.*
Int: *And could there be someone*?
V: *It would be very nice!* (laughing)
Int: *A living being, you mean? Would you like it?*
V: *Yes!* ”

(Interview with V., nine years old)

3.5 Computers and enchantment

3.5.1 The magical value of computers

In the last chapter, we mentioned that new technologies, and computers in particular, have a strong appeal for children and students. They are symbolic objects through which children apprehend reality. Their appeal seems mainly linked to two specific dimensions: magic and control.

For young children, in particular, the sense of magic and enchantment derives mostly from the intangibility and invisibility of the processes managed by the machine. (In one school, the first time they were connected, children were afraid to be eaten up by the computer and sent on the Internet, if they approached the screen too much). The sense of magic also derives from the restructuring of time and space, blurring the borders between the "here" and the "there", "now" and "then", and from the extraordinary resemblance between computers and human brains. We may even talk of animism: during observations and interviews, the children from primary schools often talked of computers as animated beings, with the same faculties as human beings, or as pets: thinking, understanding, obeying, making mistakes, being stupid.

The humanisation of computers is not only a children's prerogative. How many times have adults addressed them remarks, curses, or other declarations before their computer's performances... But in children's behaviour and declarations the attribution of animate qualities to computers is more than an accidental occurrence[1]. That is why we thought that for a computer, "he" is a more appropriate pronoun than "it", and as such it has been translated in the following excerpts from interviews:

> *He* (the computer) *is so stupid! He does not respond to my commands. He does not understand anything!* (K., nine years old)
>
> *But she (the Turtle) goes down when we tell her to go up!* (E., nine years old)

1 See the analysis of S. Turkle in her book: The Second Self, op.cit.

Writing at the computer is better because it is not us writing by hand, it is him writing with his keys. (S., nine years old)

At the same time, children are able to deal with computers as machines executing human programming. In the above quotations, the attribution of a human (or at least living) nature to the computer appears very clearly, although the children themselves mitigate it through some laughing here and there.

The following examples illustrate a more ambiguous attitude towards the animate quality of computers: children oscillate between attributing human faculties to computers and the faculties of a "made object" able to execute human commands. Children seem able to subscribe simultaneously to the two logics.

Interviewer: *And when you say that you like to play with the "Turtle", what is the reason?*
S: *Because one, one can order the Turtle to do something and she does it without arguing. You just need to give her the right orders!*
I.: *Why do you think the Turtle always does what you say?*
S: *I think the Turtle does what I tell her to do, because the diskette is organised in that way. If she disobeys, it means that there is a problem... or that a virus is in the computer.* (Interview with S., nine years old, whose father sells computers)

I.: *What do you find so fun in working with computers?*
N: *Because... I feel... I don't know how to say it, but I like it.*
I.: ...
N: *I think it is easier... because he does everything himself.*
I.: *Why do you think he can "do everything himself"?*
N: *Because* (laughing) *... Oh dear! ... Well... Mmmh... Because he is intelligent! ... Because one just needs to give him commands and then he...*
I.: *He never makes mistakes?*
N: *Sometimes, most of the time.*
I.: *And when he makes mistakes, why does he do it?*

N: *Sometimes he makes mistakes because we give him the wrong commands.*

(Interview with N., nine years old)

It is interesting to note here that children are somewhat aware that the work of human beings is behind the performance of the computer, and yet they are under the spell of its "magic". The two registers coexist in children's representations and are invoked alternatively.

Slightly older pupils (around 11 years old) are generally already socialised to the equivalence between the natural and rational in scientific discourse, and are therefore less prone to believe in computers as magic. For them, enchantment seems to derive rather from the extension of their capacities for control that the machine allows: free space from the rules established by teachers, control over their own work, control over a docile machine that systematically obeys them, unlike the majority of people in their environment...

For both young and older pupils, however, the possibility of overcoming time and space is a source of enchantment. The following story relates the experience of a "virtual" meeting of correspondents, taking place during an annual exhibition of an electronic city network of schools, in which they exchange their experiences of using ICT. The story shows that the enchantment produced by the lifting of time and space barriers has an initially paralysing effect for the children: so great is the surprise. But then, once some familiarity is acquired, the enchantment produced by the experience works as a powerful lever to mobilise the children's creative resources. Although the technical conditions were far from optimal, (and probably thanks to that), children were able to optimise their experience and enable the exchange to take place.

A virtual meeting of correspondents

The library of the National Council for Research, second day of the exhibition. A selection (about half) of the children of the fourth and fifth grades are impatiently waiting for the on-line video connection with their corresponding school in Manchester. The equipment has been made available by the national telecom company. The cost of the telephone call is supported by the English school. They are one hour late (a misunderstanding due to the existence of an hour's time difference, a detail forgotten when fixing the appointment). The children (about 15) have been gathering around the computer (a normal size screen) since 11 o'clock. Nobody has left his/her place so hard-won. It is noon, now. The confusion and the excitement are at their apex. The connection must now be imminent. Teachers have asked children to dispose in a line perpendicular to the screen, so that they can appear one by one in front of the camera and the microphone to introduce themselves to their English correspondents. The line looks actually more like a funnel, with about 10 children concentrated in the first two rows. Finally an image appears. A bit foggy. "Look, they move like robots!" — someone shouts. "Oh! They all wear ties and the same green pullover!" On this part of the screen, the style is less fancy. United colours...

They start presenting themselves, invited by the teachers. They seem paralysed by the emotion, eyes and mouths wide open. Finally, one of them has the courage to approach the microphone. You would say he is going to eat it. He says his name very quickly and rushes away, followed by a rush of all his mates. "I'm Giulia", "I'm Denis", "I'm Mara", "I'm Caterina". One of them says: "Hallo. I'm Claudia". After a pause due to transmission phase, a request to repeat the presentation is forwarded by the R-O-B-O-T-T-E-A-C-H-E-R from the other side of the screen. "Can you repeat? We did not understand a name!" They repeat their procession, a bit slower this time. Upon invitation of their teachers, and following the example of Claudia, they also say "Hallo" this time. Again a bit out of phase, one can see the reaction of some of the English children when they recognise their own correspondent. Now it is their turn to introduce themselves. They do it somehow in a more organised way, but one can see their excitement from the incredible proximity of the microphone to their mouths. It is difficult to understand their names and a child on this side remarks: "English people have a 'funny' way of pronouncing English!" Furthermore, the room in which the connection has been organised is extremely noisy (about 100 classes are present) and has a terrible acoustic. On this side, not everybody has identified his/her own correspondent.

Excitement climaxes, but things are spontaneously getting more organised. Each child passes in front of the camera and shows some pictures (their house, their dog, their favourite book) to the bunch of people on the other side of the screen, in which, they hope, there might be their correspondent.

The English teacher starts showing the English books that the children on this side of the screen have read. Their correspondents shout "YEAH!!!", each time they recognise one of them. The images arrive with a gap of a

> few seconds; it is hard to say whether their exclamations refer to this or to the previous book.
>
> Then, the children from the other side of the screen spontaneously decide it is time for games. An English song, accompanied by hand playing. The sound and the image do not quite match. Not only that, but the sound seems far away and distorted. But the children on this side recognise the song: they know it too, only the words are in a different language! Great excitement. "Let's sing it too!" Giulia and Ilaria have a bright idea. They go to the microphone and ask their classmates to pantomime the song, while the two of them sing close to the microphone that their sound effects will be better than those of their English correspondents. The success is enormous on the screen. A bit out of phase, applause from Manchester erupts like thunder. "We sing very well, better than they!" "Let's do another one!" "Yes, an English one!" Another thunder through the wires. Then the English correspondents sing a song in Italian. Exultation on this side of the screen. To answer back, the children decide to improvise a dance in front of the camera. The teachers have withdrawn and look amused and almost moved by the vitality and the organisational ability of "their" children. It is time to disconnect. Needless to say, the event will be engraved in the children's memories for a long time and will always be recalled as a "miracle", a "triumph", over time and space.

What we would like to stress here is that through this type of experience, children seem able to have access to and handle a multi-layered reality, enabling a new mobilisation of their cognitive processes. Children are asked to cope with categories that rationalism had put aside, such as ubiquity, suspended disbelief, paradoxes. They are able to transit from the worlds of "magic" and the "real", two worlds no longer opposed. Implicitly, computers, and ICT in particular, offer children (and teachers) a new opportunity to think ubiquity, denial and paradoxes as another legitimate way to access reality. It is quite a change for a school still largely inspired by the triumph of Enlightenment Reason and scientific positivism. In other words, children are given the opportunity to learn how to deal with complexity and uncertainty. Teachers, on the other hand, receive an opportunity to frame the passage between both worlds. We will come back to this point.

We can interpret the way in which children seem to understand computers and deal with their double nature as machines and human beings, with the invisibility of their processes, and with their super-human faculties, as a mark of renewed capacity for absorbing new levels of abstraction. With a function somewhat similar to traditional fairy-tales, computers seem to stimulate children to constitute and manage the coexistence of a plurality of levels of reality, without preventing them from distinguishing between "virtual reality" and empirical reality.

The magical value of computers can be an important factor for mobilising pupils' motivation. But there are many possible ways for teachers to deal with it. As we will see in the next section, teachers may try to frame and enhance this enchanted dimension, or they may try to rationalise it. Once more, it is an issue that is strongly bound to culture.

3.5.2 Enchantment and the role of teachers

In one of the cases we observed at primary school level, the pedagogical approach was based on the "magic" element as a usual pedagogical resource, even before the introduction of computers. One teacher was regularly working on building up *"a world to believe in without believing in it"*. Imaginary characters (like Wilko the Rabbit) were used as pedagogical tools to work especially on the acquisition of extra-curricular abilities, more on the side of social abilities, or simply as a way to nourish children's imagination and reverie.

Wilko the Rabbit

The shorter arm of the corridor, in the form of an "L", has been set up as the Library. On the shelves, lots of drawings, cardboard colourful characters, posters made by the children. These illustrate different historical periods, a crossroads for their seminar on "street education", and the adventures of Wilko the Rabbit, who has been hiding messages here and there in the whole area of the village and down by the river. These messages were to reveal to the children his secrets and teach them important things of life. Wilko the Rabbit has now left them to go to another school where they needed his help. (It was, of course, the teachers who were actually hiding those messages for the children to find in periodically organised "treasure hunts".) The children know it, and that enrages A., the teacher of History, Geography and Artistic Education: "This is not a fairy tale. Wilko the Rabbit has really been here! And has now left us because we do not need him anymore!" — I saw her literally shouting at the children. And turning to me, overplaying her despair: "There is no more poetry in this world!".

In this school, the ground was fertile for playing on the magic aspect of computers and using it as a resource for the children's motivation to get involved in the activities connected to their use. Teachers are aware, or at least have an intuition, of the magical value of computers. For instance, they have established a precise ceremony to access them. The teacher organises a ritual for the distribution of messages that accentuates their special status. In this particular case, it seems that teachers conscientiously reserve a role for mystery, while on the other side resorting to rational abilities and having the children manage the technical procedures connected to computers.

In other cases, we observed strategies still aimed at building upon the enchantment stimulated by the machine, but where the teacher builds up a more pragmatic approach by framing the transition between magic and the "real" world. It was the very first time that two five year-olds had ever used e-mail or a computer on-line. The context was a class project/theme on "communication". That is why they had been sending letters by post. The class was participating in a postcard project, sending postcards to other schools. They too had a "travel buddy" — a teddy bear — which was like Wilko the Rabbit, except they actually sent the travel buddy in a parcel to Australia and children in the school there wrote (by post) letters back "for" the buddy.

But enchantment is not only a support for creative fantasy; it can also provide access to real world. One of the questions adults ask about the Internet is whether children can distinguish properly between *reality* and *virtual reality*. In some of our observations, it is quite clear how small children can make distinctions between levels of reality. When C. finds a map of his family's country of origin and home, Ghana, he wants to make of it his own property so he immediately identifies people as relatives. It is a kind of ritual, since he knows well that an old man with a beard is not his grandmother. But when it comes to looking for information, finding Ghana on a map of Africa, he is firmly focused on "reality" and correctly identifies the country and is immediately critical of the quality of the map ("just as well Daddy already knows where he comes from, for no one could ever find the place on *that* map!").

The pleasure pupils feel for working at the computer, the easiness of being captured by the "magic" of its procedures and the sense of control, can sometimes lead to purposeless explorations, as some of the examples reported on WWW searches show.

3.5.3 IRC and the game of identity

With the use of the IRC, the sense of magic triggered by e-mailing, WWW-browsing and virtual meetings is multiplied: the whole world seems to be available for casual intercourse. Not only that, but IRC participants have the whole range of possible identities available for them to "wear", to play with, to dismiss like an old dress. Absolutely painlessly. The question might be asked: would this be the main attraction of this new mode of communication (the possibility to trade in one's identity and appear as someone else)? Would this be the same as self-alienation from the real world? Only one school provided data for a preliminary answer to that formidable question. We should recall here the short story *Pseudonyms, changing identity,* reported in the previous chapter. But in other examples as well, children were experimenting with the idea of identity.

In the case of IRC, the nature of enchantment offered by computers is certainly different from that derived from controlling the machine. It is much more a matter of controlling interactions, without bearing the social consequences they may entail (we alluded to this above when we discussed the pleasure of computers for teenagers). IRC offers a safe "involvement shield" for adolescents to explore new identities, including new worlds of permissiveness, which may be far away from the moral rules governing their school and home social behaviour[1]. While local moral codes may still be quite different (strict or loose), IRC builds a "free zone" in which adolescents can invent, experience, persist in, or abandon, imaginary identities, protected by the screen and by anonymity. Sure enough, adults and especially teachers may be shocked at the discovery of their boys and girls experiencing the pleasure of telling lies, swapping gender, on the "teen-chat" channel, telling unknown strangers in rather rough terms about their first sexual experience... doing all this in absolute candour.

But the danger seems to us more imaginary than real. Maybe we should recall that the 15-year experience of Minitel in France has already gone through these trends and alarms with a very limited disruptive impact on society. Contrary to the prophecies of many would-be "moral guardians", French adolescents could hardly be said to be more depraved now than before the appearance of Minitel. So, it seems to us that the relevant question to ask is another one: what is the added value for allowing these experiences to take place in school?

We should precisely reflect on the potential that this apparently "immoral" exercise has in the life of an adolescent. We could question, for example, whether they can provide an extraordinary (and extraordinarily safe) training ground for adolescents to reflect on their own identity. We could also question whether this new mode of socialisation is actually so harmless, allowing boys and girls to actually stay on the surface of the question of identity, without perceiving the deeper implications. IRC in itself could be seen as nothing else but a "para-social interaction": like Horton's old ladies in 1955 getting involved with the TV anchorman in their nursing homes, teenagers of year 2000 become "intimate" with each other around the globe while staying at their desk. This is something rather innocuous from the point of view of physical and moral integrity. The shadowing risk might be alienation. But, as for physical and moral dangers, we doubt that alienation lies in the medium itself. It seems to us that this risk can only derive from the deficiency of the environment to provide adequate framing. The interest of IRC is probably not so much on the side of the exchanges taking place. It lies in the exploration that the adolescent can undertake of their own identity as well as the very concept of identity. They can do it alone, or together with others. And here, it appears more than appropriate for school to take a role.

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1 In that respect, IRC is similar to role-playing games (cfr. G. A. Fine, Shared Fantasy: Role Playing Games as Social Worlds, University of Chicago Press, Chicago, 1983).

> *" And... now I have just written to those in... yes, I think, Udine... No, it was Manchester... Or, was it Udine? I do not remember... I think it is Manchester... No, no, it was Udine, Udine! ... that we have seen our correspondents in Manchester and... the name of my correspondent in Udine is Jasmine, that in Manchester, Ja... Jas... Jasmine... No! Jennifer!. Jasmine is the one in Udine. Jennifer is the one in Manchester ".*
>
> (A child in primary school)

3.6 Communication and ritual in electronic correspondence

3.6.1 E-mail as an exchange of blazons

In the different classes we visited, a large part of our observations focused on e-mail exchanges. Correspondence has been a regular school activity for years: letters, postcards and even faxes have been a "pretext" for written communication. Pupils and students produced texts, exchanged discussions on various themes with peers, involved themselves in exchanges with other students from other cultures, or practised foreign languages. Implicitly, these practices seemed to give a special status to the "elsewhere", a powerful stimulus for motivation. The advent of new communication technologies has magnified this aspect. Not only is the "elsewhere" preserved, but a new dimension is added: the elsewhere is *now*. And it being now, it is *here*. Time and space dimensions have been modified by the capacity of new communication technologies to overcome physical distances at an incredible speed. Through computers, correspondence activities have been boosted, their pedagogical virtues recognised more widely.

In the experiences we observed, both young children and older students, sometimes even teachers, seemed to enjoy these activities very much, totally absorbed and concentrated in them. Once more, many did not seem to perceive these activities as work, but rather as in-between work and play. We observed different types of exchanges: collective and individual letters to a classroom, collective letters to individuals chosen from a network, individual letters to individuals. In some cases, e-mail was a component of a project including other non-technology-based activities; in other cases, e-mail was the core focus of a project.

The number of messages exchanged per student varied within the same classroom, as did the length of messages. It was dependant on several factors, such as the quantity and frequency of answers received by each student, the availability of computers in the time allocated to correspondence, the rapidity with which one writes, the possibility of writing the text off-line in class or at home, on computer, and simply having to copy and send the message from an on-line computer. In some cases, the correspondence with partners was unstable, without continuity, the partner changing every time or after a few exchanges. In other cases, the correspondence partnership was stable, lasting more than a year.

The content of correspondence exchanges, unless they were thematic, did not vary dramatically, neither across countries, nor across ages. Essentially, it was very often a question of "Me, Myself and I", with (in some cases) the addition of "And you?" Young children tend to concentrate on definitions of themselves through what they have (a house, a sister, a cat, a boy or girl friend, a present, a father's car) or what they like (chocolate, holidays, computers). Sometimes they venture into telling their correspondent what they did yesterday and what they will do tomorrow. In some cases of intercultural correspondence, we observed their interest focusing on comparing differences. But, more often they seem to be more interested in common factors: "We like the same cars...". Older students, apart from their own presentation, including physical details, exchange information about their hobbies. Sometimes their correspondence can become mono-thematic (football, cars, Spice Girls...). When the exchanges took place in the framework of a thematic project, the choice of themes was also surprisingly homogeneous: "weather" for young children, "historical and cultural traditions" for older ones, "ecology and environment" for both. Perhaps such themes appeared often as they are obvious starting points for exchanges.

One feature in particular of many of the messages we observed in the different exchanges across Europe surprised us. How can pupils and students invest their energies, expectations and enthusiasm in messages so conventional, apparently meaningless, exchanged with a correspondent that in most cases they have never met, almost abstract ("I am 12 years old, I have two parents, a sister and a cat...")? The themes exchanged are not much less trivial even when correspondence has been going on for a relatively long period, on an individual basis, with the same correspondent. The letters seem rarely to inform or to request information, or to build on the affective component of the exchange. The attributions exchanged (the cat, the father's car, the blue eyes...) could appear more like conversation fillers than a real conversation topic on which to build future exchanges. But maybe it would be more appropriate to qualify them as "blazons", ornaments.

All the children and students we met, with very few exceptions, of all ages, seem to value these exchanges of blazons and ornaments so much. It seems they have so little to say, and nevertheless they care for maintaining the exchange. They often invest a great deal of effort in editing and polishing their letters to a high standard. That is why we would like to hypothesise there is more to the act of letter-writing than the informational value itself. What children exchange is not the mere information, but rather symbolic goods which represent the foundation of social relations. And these social relations are important to them because they are a source of status, *vis-à-vis* both their correspondent(s), as well as their classmates.

3.6.2 E-mail as gift/counter-gift

We could then say that the exchange of messages is rather like the circulation of shells in traditional communities of the South Pacific, framed in a Maussian[1] gift/counter-gift structure. E-mail becomes the contemporary medium of exchange.

We have witnessed the efforts invested in winning back a faltering correspondent, the prestige deriving from the number of correspondents (some children prefer to maintain several correspondents, in order to diminish the risks of being "without"), or the high value attributed to the number of letters received from the same correspondent, compared to other classmates. Everything happens as if writing messages is regulated by the same rules of exchange, of "give - receive - return", described by ethnologists of the Maussian school, rules which still govern many of our social exchanges[2]. Nothing is for free: the exchanges are regulated by the obligation of reciprocity, in an endlessly spiralling relation. Gifts have the purpose of creating and maintaining a social relation which is a source of status.

A basis of this type could explain the curiously artificial and voluntarist character of many exchanges — as if they were exchanging symbolic objects, and not information. For example, some pupils admit to "cheating" by systematically looking at other classmates' messages for questions to ask. It is important that the process results in building the exchange relationship. But it is also important that one person does not put the other member of the exchange in the position of not being able to "return" adequately. This might be one reason why corresponding with students for whom the chosen language is also a foreign language is very much

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1 Maussian here refers to both the anthropologist Marcel Mauss and the Journal of the MAUSS (Mouvement Anti-Utilitariste dans les Sciences Sociales), following the steps of Marcel Mauss. See M. Mauss, Essai sur le don, (1923-24), in Sociologie et Anthropologie, Paris, PUF, 1950.

2 See for example J. Godbout, L'Esprit du Don, Editions La Découverte, Paris, 1992.

appreciated ("It is funny to see their mistakes"). It is as if it made one's own mistakes less embarrassing ("We have fewer complexes; they are at the same level as ourselves"), lowering anxiety as to the adequacy of what is "returned". Even so, a good correspondent has more than once been described to us as "one who asks a lot of questions", because this makes it much easier to reply, or in other words, to adequately "return".

The importance of receiving a message is very clear: not receiving an answer from a correspondent, or excessive delays in receiving it (persisting in spite of the virtue of ICT to break the barriers of time and space, but not those of organisational problems!), is a serious source of disappointment. "I haven’t got a letter! I’m stopping, I’m off!" Sometimes the disappointment is turned by teachers into a way to help children learn patience and tolerance. But for those who get letters, there is real joy about the number of messages received, resulting in strong motivation to send back a reply.

Interest in exchange for its own sake is particularly strong in primary classes (it is also the age for exchange of physical objects: cards, stickers, etc.), but it seems to persist too at the secondary level, where it seems to merge with the concern of adolescents to present themselves in a certain way, to display a persona, and to imagine or even invent the personality of the correspondent up to the point of "seducing".

With older pupils, we begin to see in some cases more concern about the content of the exchange. The exchange of correspondence is also seen as an intermediary step possibly aiming at face-to-face interactions. Actually, the mere act of correspondence seems to have less attraction, the older the pupil (they sometimes told us that they would like to meet their correspondents before writing to them). But even so they remain very involved in the exchange process and are upset when they lose a correspondent.

The exchange of correspondence seems thus to activate a particularly powerful motivational lever, which even teachers who use correspondence in class often tend to underestimate. Several of our teachers do not seem to have understood the importance to their pupils of the very act of establishing a reliable and stable exchange partnership, or the anxiety they experience when they lose a correspondent.

3.6.3 The teacher as master of ceremony

As we saw, exchanging correspondence through e-mail is more a relational ritual, than a simple exchange of texts and information. The production of texts, the use of a foreign language, intercultural exchanges, are certainly worthy pedagogical objectives. But there seems to be an objective which is often missed or under-valued by teachers: exchanging letters through ICT can provide a framework for training pupils in fundamental relationships as old as society itself. It can help them appreciate and acquire a very important social competence: the production of rituals contributing to societal communication.

There needs to be a framework of conventions in order for pupils and students to complete their exchanges. It is not enough to find a partner. The partner must be kept, and this is a more challenging task. Teachers often believe that, once established, an exchange will continue and its value increase on its own. But children, left alone, might invest or withdraw from investing in the relationship. It falls on the teacher to ensure the stability of correspondence and discuss the conditions with the children. Left to themselves and faced with an almost unlimited number of potential partners, some pupils prefer to collect correspondents, sending on each occasion much the same message to each. Our observations show that inputs from a teacher are essential to ensure that correspondence has substance and a deeper social meaning.

There were several possible strategies that the teachers we observed adopted to try to make of correspondence a meaningful event. For instance, some of them systematically preferred correspondence conducted within a network or between two classes, over exchanges going off here, there and everywhere. A specific network seems to offer certain advantages: a structure for writing (themes, targets), but in particular a wide choice of partners on the basis of affinity.

The pairing of classes makes it more difficult to take into account specific interests of individual pupils. In one class we observed, pupils had difficulty in finding a kindred spirit in the partner school, especially as there was a large age difference between the classes. The older pupils felt that the exchange was constrained by the lack of common interest between pupils. These pupils felt they were to some extent devalued by having to take part in a thematic activity on which they had not been consulted. When there is correspondence between two classes it is essential that the teachers plan together — an excellent opportunity for teachers to gain experience of working collaboratively — the major part of the activity, taking into account the constraints of the school year (national holidays, school holidays, school journeys, examinations). Our observations lead us to believe that even experienced teachers have a tendency to underestimate this parameter.

In one class, the teacher introduced alternation between individual and group exchanges on a theme, in order to prevent the correspondence stopping prematurely, and to give the project greater cohesion. This was an interesting strategy, but had the disadvantage of occasionally interrupting the continuity of those individual exchanges that were already working well.

In one case, where all the correspondence was organised around the underlying idea of making young adults aware of the different political and social conditions of their countries, in particular regarding the question of peace, pupils from a European school exchanged messages with pupils in a school on an Israeli kibbutz. The project was extremely interesting in its conception, but the framework supporting this rather ambitious experience was too frail. The sessions were spaced too far apart to allow the theme to develop and the tasks for each session too numerous (usually several messages to be read plus an answer to write). Furthermore, the teacher did not provide the pupils with documentation which would have helped them go into depth. Here is an example of that correspondence:

> ***Corresponding with Israel***
>
> A la deuxième leçon, les élèves devaient lire quatre messages (dans un fascicule qui leur a été préparé par l'enseignante), leur message personnel (s'ils en avaient reçu) et trois messages sélectionnées par l'enseignante ayant trait aux conditions géographiques et sociales du kibboutz et à l'accident de deux hélicoptères militaires récemment survenu dans la communauté. Pour rédiger leurs réponses, les élèves devaient s'inspirer de trois questions préparés par l'enseignante; on attendait notamment d'eux qu'ils réagissent à l'évenement dramatique.
>
> L'accident était survenu pendant les vacances de ski des élèves et ils n'en avaient pas entendu parler. L'enseignante leur apprenait la nouvelle, en dramatisant en anglais, pendant la leçon. Les élèves étaient assez empruntés devant l'attente explicite de devoir se référer à cette situation, mais aussi devant l'attente, implicite, de faire part d'un sentiment envers une ou des personne qu'ils ne connaissent pas.
>
> Seulement trois messages y font finalement allusion :
>
> *I just read your message and I'm really shocked what happens with the plain* [sic] *crash. I'm feel very sorry. I haven't heard anything about that terrible accident in the news, because I haven't usually time to see the news on the television.*

In other cases, different activities took place involving correspondence, like the construction of web pages. This stimulates work in relation to themes (school, town, class).

The most successful experiences of individual correspondence exchanges were those in which the teacher mastered, or had at least an intuition of, the importance of the ritual dimension. That entailed building on the magic, on the exceptional character of the event, stressing the symbolic value and effectiveness of technology.

We have already mentioned the efforts made by a primary school teacher to ritualise the distribution of the messages received. The teacher seems to perceive that those messages are important because they are a source of social status. That is why she creates suspense, by dropping the messages slowly and rather theatrically into the children's mailboxes. That is why she chooses to link the reception of those messages to the completion of the most boring activity for the children: exercises in their school book. In the same school, a meeting has been organised with the class with which they correspond in their own country, after a few months from the beginning of the exchange. The event has been prepared a long time in advance and presented as a special occasion, dropping some information day by day, planning the activities that will have taken place, letting the children fantasise about what could happen. The correspondence with that class has been going on for over two years, in spite of the technical difficulties of the other school (lack of computer infrastructure and need to use that of another school).

But whenever this effort of ritualisation is not made, it seems more difficult to maintain the correspondence in the long term. The more so with young children. The next short story is about a missed opportunity. Two corresponding classes had the chance to meet on the same bus on a trip, but the event was not anticipated to the children, nor prepared at all by the 2 teachers. No framework was offered to recognise the situation as valuable and profitable.

> ***Communication unachieved***
>
> When they had the opportunity to be with their correspondents of E. in the same bus going together to the Futuroscope, the children of E. and those of V. did not have any discussion together. When asked the reason why they did not take this opportunity for direct and personal contact, the children of V. varied in their explanations. Some attributed to their shyness the fact they did not try to talk to the other pupils. Some just said that they had not been introduced. Some explained they were so moved and excited at being with their classmates on the bus that they had no time left to start talking to the others.

In this experience, the teacher recognises that: *“ ...Interclass exchanges are very irregular... ” an*d that they seem to work only when there is an underlying specific project. She believes that they *“ started too early in communication activities and both the kids and the teachers are disappointed by the exchanges that are taking place. Correspondence is a very serious thing for them, if they get no reply, they no longer invest in the activity and lose interest in it. They have been awfully disappointed ”*. And she recognises it is largely the teacher's responsibility.

Even in the case of intercultural projects is not an easy task to make the experience work. It is not enough to play on the dream of a faraway correspondent. As a teacher told us: *“ The dream of a faraway correspondent… I don't think they realise this distance, they have no 'construct' for that perception. Therefore it is not a very strong motivation factor. For them it is as nice to correspond with someone in the city suburb as with someone in Quebec. ”*

The intercultural objectives are not attained by the simple presence of a partner of another culture. They need to be carefully built into the experience. Intercultural aspects need to be constructed through dialogue between pupils and teacher. In some cases, the intercultural objectives of one project quickly revealed themselves as inconsistent, both for teachers and for learners.

Maybe the choice of developing exchanges on specific themes could contribute to the development of the notion of interculturality and make the correspondence more consistent. But one teacher involved in a Comenius project warned us that it is very important not to choose themes that are too difficult for the pupils/students, because expressing them in a different language finally becomes a very heavy burden for the teacher and brings about very little benefit to the children.

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3.7 Dealing with Uncertainty

3.7.1 Meeting uncertainty

School has for decades been a universe in which stability, certainty and predictability were values in themselves. As values, they were ensured by the central position occupied by teachers in controlling the class activities under their responsibility: teachers could determine the work programme for a class (in the framework established by central authorities), fix its ideal pace, a standard for all children, keeping a certain control. Teachers could do it without being asked to venture outside the boundaries of their competencies. In these last years, this prerogative has become less essential: new political and existential ideals brought school to open up to this change. This change was not brought about by the advent of computers in the class. In fact, it also happened that computers were neutralised at the early stages of their school employment: either they were used in the framework of special activities, often extra-curricular and/or optional, or as sophisticated calculating machines in the hands of experts. In the worst of cases, a cabinet with a lock could provide a sufficient defence against the perceived threat of inadequacy.

But with the evolution of the perception of computers as objects of everyday life, yet mythical and powerful, their "opaque" world has become an element to deal with. Social pressures make the locked cabinet less and less legitimate in school. Computers are there, they have their supporters and even the most reluctant of teachers has sooner or later to face them and come to terms with the "opaqueness" of their world. Computers can get stuck, "refuse" to cooperate with teachers, they can "baffle" them with their "unexpected reactions". But especially, computers are difficult to classify as school objects, computer-based activities difficult to assess in the traditional fashion. With ICT, in particular, the access to wider, uncontrollable information, creates new challenges to the unique "authority" of the teacher. The "opaqueness" of computers, the deliberate non-transparency of their processes becoming part of our daily experience, are likely to make us establish a new relation to uncertainty and the unpredictability of events. We may speculate that uncertainty and unpredictability will no longer be perceived as a threat to our control over the world, but as a source of knowledge, an expression of the complexity of the world as we represent it in post-modernist times. Possibly, they will be a stimulus to our creativity.

In primary schools, we could observe that a less anxious attitude *vis-à-vis* uncertainty is gradually developing, while in most secondary schools, many factors seem to determine a slower pace of change. Several factors seem to work in favour of teachers maintaining closer control of their own domain, resisting uncertainty more actively: teachers' subject specialisation and their consequent unquestionable competence in teaching their specific subjects, the actual "balkanisation" of curriculum, in spite of growing interest in interdisciplinary activities, the complexity of power relationships among the different teachers, the pressures from outside, the need to be competitively attractive for parents (e. g., to deliver a central national curriculum, to get children to succeed in national exams, etc.).

Working with ICT, especially on-line, becomes even more unpredictable. This "unpredictability" seems to cause less prejudice to children than to teachers. For children, there is no threat to their status; on the contrary, just a new opportunity to occupy a new ground, which is not controlled by their teachers. Most children cope well with computers, with their "opaqueness" and with the particular uncertainty this "opaqueness" entails. After all, they have begun their lives in a different world from their teachers, a world where the feeling of uncertainty is a daily experience for many. Only a few children seemed uncomfortable in front of the uncertainties brought about by the machine and the lack of control they experience with it, as the following story shows:

Why doesn't it want to correct it?

L. is on command, T. helps. Three lines are typed; L. and T., the two girls decide to check with the spell-checker. Part of the sentence is: "Un policier m'e**n**mena en prison" which should be written "Un policier m'e**m**mena en prison". The spell-checker displays "m'e**n**mena". L. hesitates. There is no other word proposed by the spell-checker, the commands available are: Replace, Verify, Go to next, Keep, Cancel. As L. understands there is a misspelling (namely because of the physical tension of T. besides her). She wants it to be corrected: she validates the Replace button and the misspelling stays unchanged. She is not satisfied and she feels the impatience of T. growing. She again starts the spell-checker and again it displays "m'e**n**mena", again she asks this to be corrected in activating Replace. Though it doesn't do what she wants she repeats the operation four or five times, becoming more and more upset since she knows and sees it is not corrected. She is not really aware of her mistake, she just feels uneasy and is so concentrated that she cannot even hear T. besides her whispering "*two m*"; however, she answers automatically the suggestion she ignores:

- *Yes I know, but it does not want to correct it.*
- *It' s wrong, correct it.*
- *Yes I know, but it does not want to correct it.*

But L. becomes more and more stressed (she looks at her hand on the mouse and then the screen and then the keyboard alternatively). T. does not insist, it is clear she respects her friend. She understands that she cannot help her as L. is not available to hear any remark. The tension becomes critical. L. turns to me and asks:

- *What's happening?*

The question is so strongly directed at me that I really feel responsible.

- *You know I am not a teacher, but I remember that in French an **n** before an **m** is always transformed into **m**, and this gives **mm** instead of **nm**. I always used this recipe, and it always worked,* I answer.
- *Oh! yes, I remember, but why it is not corrected.*
- *Because it does not propose to you any other word than the one you wrote. When you command Replace, it replaces with the word which is displayed in the window. If you don't change the word, it is kept as-is. So you have to correct it yourself by changing the **n** with an **m** by typing it and then ask it to replace.*

Generally, however, it emerges from our observations that children are more irreverent towards computers than teachers are. In front of the unexpected, at first children may react with horrified gasps. But after the initial reaction of panic and dismay, they usually improvise positive reactions, they try solutions. These unprecedented situations actually seem to amuse them. (There may also be a relationship with the hybrid status of work and play that computer-based activities seem to have for them).

Although some of the teachers are coping well with the challenge, it is more frequent to observe anxiety among them, faced with the lack of control of situations that should "naturally" fall under their control. In the following sections we give an overview of the different ways to approach the uncertainty with which teachers and institutions are confronted, as we came across them in our observations. For schematic it may seem, this exemplification helps us identify four main possible trends: teachers might try to control uncertainty through formalised procedures; they may try to protect themselves "in order to protect their children"; they may accept unpredictability by building a stabilising framework; and, finally, they can try to make of it a pedagogical tool which can *" prepare children to cope with the uncertainties of life "*.

3.7.2 Controlling uncertainty

In some cases, we observed systematic action to control the access to computers (whether they are stand-alone or networked) for teenagers. And then, once the access is a right acquired, the procedures to operate them are also extremely formalised. For instance, in one primary school, access to computers is regulated by a quasi-charter. The document is very precise and to the point. Although its rationale is certainly grounded in the need to make the access available for all — teachers and children — on an equal basis, it may nevertheless reveal as well a response to the need to diminish the anxiety linked to activities perceived as "less manageable" than traditional ones. It also brings back the question of trust and mistrust, discussed in earlier chapters. Here is an excerpt from the document regulating the access to computers in the school of***.

> ***Formal rules to access computers***
>
> *Check points for ICT-Certificate 1.*
>
> *1-10: Basic knowledge and skills in Windows.*
>
> *11-23: Basic use of word processing.*
>
> *24-32: Rules for the use of hardware.*
>
> 24. Everybody working without a teacher present must have a certificate.
> 25. Everybody has to log on to the net (networks) with personal name/class user name and password.
> 26. Documents must always be saved at area H on the hard-disk or on personal diskette.
> 27. Everybody must log off the net (networks) when they are finished with the work.
> 28. The computers shall not be switched off during the day.
> 29. Food and beverages shall not be close to a PC.
> 30. The parameters given for the use of the machine are not to be changed.
> 31. Technical problems shall be reported to the class teacher.
> 32. Breaking the rules may lead to confiscation of the certificate and access to ICT-equipment.
>
> *Check points for ICT-certificate 2.*
>
> *1-10: To find and use information from Internet: World Wide Web (WWW).*
>
> *11-23: Use of e-mail on Internet: Eudora.*
>
> *24-30: Rules for using Internet.*
>
> 24. Pupils using Internet at *** have to sign a special contract.

25. Internet at school is supposed to be used as a resource for learning by agreement with the class teacher
26. Good web pages found are supposed to be registered as bookmarks.
27. Pages that are downloaded must always contain a reference to a http-address.
28. Pictures and video shall not be copied to diskette/hard diskette without agreement of the class teacher.
29. Publishing of WWW-pages can only take place after agreement with the teacher and ICT co-ordinator.
30. Breaking the rules can lead to confiscation of ICT-certificate 2.

The different skills addressed by this set of rules may concern technical mastery as well as behaviour principles. Expressing them in such a detailed manner corresponds, on one side, to a precise choice of a learning model, that of the "planner": computers must be appropriated through a precise sequence of steps, decided by a central authority. Very little is left to the exploratory style of learning (*"bricoleur"*[1]). On the other hand, one could argue that the advocated respect for these rules turns out to be a form of neutralisation of the "subversive" power of computers, a way for the school to control the foreign body, a bastion against the unpredictability of technology. Rules are here as a guarantee for order and predictability. And they are accompanied by sanctions, *Such behaviour might result in not getting certificate number two*.

In this school, children complained that the rules for the use of the computers had not been discussed in the pupils' council. One of them was unhappy about having to pay a fine if the pupils lost the certificate and having to get a new one. *" It would have been an advantage if they had been able to discuss the rules in the classes before they were ratified "* — he told us. Rules on access and procedures seemed to have a very reassuring effect on the teachers in this school that allowed the extended use of ICT as a tool in school work. Once teachers were reassured, this resulted in increased freedom for the pupils, who could be in front of the computers all alone and were granted quite a high degree of freedom in their activities.

3.7.3 Protecting children and/or protecting teachers

Arguing that young children need to be protected and that this is the teachers' duty shows another attitude towards the uncertainty deriving from ICT. A teacher in primary education, who was hesitating to invest more in using technology in his classroom, motivated his position as follows:

> *I guess... I am over-protecting them, maybe doing so, I am trying to prolong their childhood. But doing so, am I wrong? Who can demonstrate to me that I am wrong? They are happy, and also they are on schedule for their formal obligations, and they perform well. Of course I can understand that another approach may be more profitable to them and obviously that is the reason why I am ready to change. But I really fear that implementing an approach I don't really feel comfortable with will affect their progress. They are children and I have a strong feeling of responsibility towards them. I think you have there the different keys for understanding my uncertainty and perplexity.*

Another teacher in the same school was asked whether he thought that part of the problem he was expressing concerning ICT was due to his anticipation of losing control over his class as well as the intense human relations he had with his class. We also asked whether he was feeling

1 This argument was described in Chapter 2.1.

threatened by changing his behaviour and letting the children reorganise themselves, with a potentially diminished focus on him. He gave us the following answer:

> *Honestly I don't know. We had some discussion about it together. I am very interested in discussing it with you. But there are also real constraints you have to cope with: if you do it badly it is the children who will suffer from the consequences. It is a responsibility which obsesses me. When I see what MC does I really admire the way she manages the chaos, she really is able to do it, and personally I don't know how to do that. I feel it is too big a risk to take with my own class. You must understand, it is a very real thing. On the one hand with whole-class teaching, it is clear to me that I cannot give to every child all that I want to give her/him, and on the other hand I don't know how to go about giving them individually what they deserve. I am willing to after my pedagogy to cope with all their individual needs but if I take my present class: I have two clear groups and a gap between them. In one group there is a lot of collective activity we can conduct on the basis of workshops and the small groups they form have a variable geometry according to the different tasks. In the other group I have children in a real situation of scholastic "unsuitability". That is why I wonder at the end if I was not right to adopt a low profile because it enabled regular use of IT in my class. Unfortunately this low profile also has bad effects: some of my children were "in-demand" regard to ICT use and as I personally delayed in order to keep my class running, they grew weary.*

One could argue to what extent this concern over the children does not correspond to a general discomfort or anxiety towards unpredictability. Using ICT has led these teachers to face their own uncertainty.

3.7.4 Accepting and managing uncertainty

Accepting and managing uncertainty through stabilising frameworks is an attitude we observed especially in situations of "low context embeddedness" (to use an expression by E.T. Hall). It is the case of a school in a socially disadvantaged area, where racial and social conflicts are latent, if not manifest. The school acts as a sort of "safe havens", reassuring and protecting children against the chaos of the surrounding environment. The Internet is providing the opportunity to teachers to take the children to a richer world.

In this school, computers have been used for a very long time, and teachers are now used to coping with the uncertainties deriving from their use. The way they deal with them seems to show that they need to build a structured framework in which to channel them. Uncertainty is for these children an everyday experience in the outside world, and it is often a negative one. What children seem to need is a structure. Technology represents a structured way to reintroduce uncertainty, but with a positive value.

One of the teachers told us that she aims to get two or three children in each class fairly confident so that they could then show their friends how to use e-mail and the Internet, with loose supervision. These children must be able to read — the teacher selects the more literate children. About 20 children in the school have used e-mail and the Internet. Work with communications technology is more challenging in some ways than traditional off-line work. Children are at first uncertain how to react. The work gets children thinking hard about problem solving.

The following excerpt is presented to show how the teacher guides the interactiob of five six year-olds within a purposeful framework, in a structured way, so as to build self-confidence and prepare them to face possible uncertainties.

Writing stories

Teacher: *We're going to learn some new keys ... we're going to see what this button does...Who remembers?*
Children: .... *Space bar!*
T: *and what is this one?*
C: *Rubber!*
T: *Who remembers the actual name? .... It begins with d. d. d... "Delete". It means to rub away. Now do you remember, if you press ENTER...*
C: *It goes back to the beginning*
T: *And this one?*
C: *If you want to get a bigger letter.*
T: *Do you remember its name? It begins with a "sh"... sound.... SHIFT ... because you shift the letter up.*
C: *It makes big letters*

She then helps them find the other shift key and the capital lock key and shows them how to use them. They prepare to start typing the story.

T: *Now we won't be able to type all at the same time.* C. to the keyboard. *We have to start with a big letter. How are you going to start?* (Boy mumbles something.)
G: *I'm going to talk about when I went to the seaside!*
T: *Lovely, well you can start thinking of all the words* (to C.). *Would you like some time to think? ...*

3.7.5 Using uncertainty as a pedagogical tool

Finally, we met some cases in which uncertainty and unpredictability were not only accepted but also emphasised as a positive pedagogical tool for children to find points of reference in the uncertainty/unpredictability of life. This was the attitude at a primary school level in a socially homogeneous and relatively stable environment. The following short excerpt provides an example of total acceptance and acknowledgement of uncertainty as a pedagogical value.

Emphasising uncertainty

... All of a sudden, in the middle of a history lesson made by a pupil, the classroom is invaded by P., another teacher and a group of children from the fourth grade. A., the teacher in the invaded classroom, invites E., one of her students, to return to her seat. "Bravo! It was a very interesting "lesson". Ah, could the others be inspired by you!" — she laughs. E. laughs as well, as does everybody else. A moment of general confusion follows. They need to reconstitute the different sub-groups and allocate them to the different activities. The children make jokes at the teachers, who look puzzled and lost, as usual, and who maybe overplay it to amuse the children. R., another teacher who has also joined the crowd in the meantime, smiles at me: "At least, they will find their marks in the chaos of life!".

However, the teachers in this school express some worry as to the likely difficulties their children will experience when they move on to the more rigid system of secondary education:

… They will certainly have some problems when they go to secondary school. It will take some time for them to adapt. You have seen how they move here. They are used to being very independent. Children in secondary school have to get used

> *to much more traditional manners. They are used to tons of homework, that we never give. We are expected to load them with homework, but, what a waste! At this age they do not know how to study alone. And they need to play... I refuse to adapt my programme to those requirements, "so in secondary school, they will...". I do not want to think this way. It is not primary school which has to adapt to secondary. They are children of primary school and they do things right for their age. It is not me who has to reform, it is secondary school!*

We would like to conclude this short overview, by considering on the value added by ICT. For us, it seems to rely very much on the ability of teachers to give up their power of control, and their desire to protect their children, so that uncertainty can become a positive value and an important pedagogical tool. As we saw, the way in which uncertainty can be transformed into an asset depends in large part on the social conditions of the environment. Furthermore, there is also a structural difference to the value of uncertainty in different cultures in Europe: some cultures have integrated ways to deal with uncertainty in their value systems, while other cultures are more inclined to dominate it.

v

3.8 Relations of power and the power of relations

We have already seen that technology has strong symbolic value. Computers are not only machines: they are symbolic objects that children and teachers invest with representations that transcend their material envelope. As such, they are arenas for power negotiations and rearrangements, sometimes for power struggles. This can be seen at different levels: at the level of the relationship between teachers and the institution; at that of the relationships among teachers; at that of the relationships among children. Finally, the relationships between teachers and children will be dealt with in Chapter 3, Conclusion.

3.8.1 Teachers and the institution

The introduction of ICT in schools and their integration in pedagogical activities is often a matter of pioneers' commitment, be this motivated by faith in ICT's pedagogical value, or by opportunistic calculations. An interesting dimension concerns the dynamics generated between the school management and the teaching body.

The following story illustrates a case of tension between the principal of a school (proactive in the promotion of ICT) and the teachers (rather indifferent). In this case, Mailbox was used as a seal for legitimacy to push the action further on.

> ***Implementing ICT, in spite of the lack of teachers' support***
>
> The action plan for ICT was ready in February 1997.
>
> In December 1996 the principal of the school of*** undertook a survey of teacher competencies in ICT on the basis of a questionnaire. The survey showed a discrepancy between intentions in the plan and teacher qualifications. Two teachers were against using ICT, a fact the principal accepted. Few teachers knew what the Internet was and most of them had difficulty in understanding why ICT was prioritised with a lot of money.
>
> In spite of this, the principal decided to proceed according to the plan. An auditorium was equipped with advanced multimedia resources. The Media Centre and the auditorium were linked. This made it possible to use the

auditorium for big teams, going through exercises together before practising them at the Media Centre.

The next step was the in-service training. The vice-principal concentrated his personal ICT workload on just the task of being ICT teacher for children in grade 6. The ICT co-ordinator was given responsibility for grade 4, while the music teacher took responsibility for ICT education in grade 5.

As teachers and pupils developed competencies, equipment was put into use.

The meeting with the Mailbox representatives was a useful opportunity for the principal to "sell" the importance of ICT to the staff present. To take part in an international project and provide access for observation in their school gave a kind of external legitimacy to the plan developed for certification and the use of ICT in the different curriculum areas. We observed a "selling and marketing" situation on the part of the school leaders, giving the teachers an option they could not refuse. One teacher from grade 5 had obviously no understanding of how she and her team could make use of the Internet and E-mail when doing the project in April. However, she was unable to object to the principal's commitment, which was made publicly before not only the school itself, but the Mailbox team as well. We strongly got the feeling that we had been used as an instrument for persuading, indirectly forcing, the insecure female teacher to start using ICT in school.

This excerpt and the observations which followed at the same school show that it is important to have the support of the teachers when implementing ICT. The lack of their involvement, as well as the lack of a pedagogically sound project, can hinder successful implementation.

The following story shows an opposite case: the way in which a principal, with no particular opinion on ICT, has given her agreement to the initiative pressed by one of the teachers in the school. And, in spite of her still being resistant to using the machines herself, and still not having a direct opinion on their usefulness, she has become an active supporter of the activities.

Technology is not everything

The secondary school hosts children from every social class, but with a strong dominance of medium-high bourgeoisie. Apart from the teachers originally allocated to the school, part of the teaching personnel come from a school in a working class area of the city, which was closed in a programme of reduction of schools which followed a demographic crisis. O. is one of those. In their former school, those teachers had developed a lot of activities suitable for motivating their children, among whom some could be considered "difficult" cases. Among those activities, was the establishment of the electronic network. That was one of the schools in which the project was initially experimented and it produced the first encouraging results. When O. was reallocated to the new school, in spite of the absence of computers, he decided to try to pursue these activities in the new environment — an environment, with far fewer problems of integration and adaptation, in which "difficult" cases are exceptions.

The first day I was in the school, I had the chance to come across the principal, who had previously given her formal agreement to my presence in the school, without questioning much what I was up to. She entered the well equipped computer lab and the scene took immediately

> surrealistic connotations. The principal is a lady in her late fifty, early sixty. She looks like a living portrait of a principal, who could be drawn from "Cuore", the famous last century socialist-philanthropic novel by Edmondo De Amicis set in a school, in which the poor were good and dirty, the rich mean and clean, teachers either devils or angels and principals, inevitably severe and austere.
>
> When she entered the class, nobody paid too much attention to her, nor she did pay any attention to the children nor to me. She pointed straight to O. to consult him on some school matter. Apparently, she does it very often. She trusts him blindly. "One day" — he said to me — "I gained her unconditioned trust. I don't know how. I managed to convince her to invest a big portion of the donations received from some banks to purchase the computers you see here". In fact, the equivalent of 15,000 ECUs out of the 25,000 received have been spent on technological infrastructure. The principal is not interested in technology; she probably has never touched a computer with her hands, but she trusts O.. If he thinks it is good, it must be good. She might also think that, after all, it brings some prestige to her school. And behind her rustic look and manners there is a lot of energy and devotion to the school.

This episode, taken from the journal of one of our researchers, also shows us that decisions are not always founded on technical-rational elements. No consideration of cost-effectiveness, for instance, was developed by the principal to decide on the investment in ICT. She was convinced by the energy and faith shown by O. And, even more, by the rapid success of the experience in terms of the number of O.'s colleagues involved, by the appreciation of children and, indirectly, by their parents.

A more institutional, but no less effective, solution was that taken by two of the schools we observed. Following a practice largely established in their country, they established school IT committees to bind outside forces and in-school needs into a common strategy. The two schools used these committees to decide how to implement strategy, monitor progress, and contribute to its continuing development. In both schools, ICT strategy was seen as an element in school strategy on learning and teaching.

3.8.2 Teachers talking to teachers

ICT can be an object of contention and competition among teachers. The following narration shows us very well how setting up a Media Centre became a source of conflict within the teaching staff of a school and a symbolic playground for internal power struggles.

> ***A strategy for enhancing competence by combining private and public sector: ideals and realities***
>
> In the beginning of the 1990s the vice-principal started what today is called the ICT Pedagogical Centre in the Municipality. By chance a few teachers came into contact with a foreign software company of teachers. They started to collaborate. The idea was to translate the software and distribute it to other schools. Money started to pour into this project. It became necessary to find a way to arrange it outside the school. The teachers involved founded a computer centre that was totally commercial. This has expanded and developed into a collaboration with the secondary school. Together, they formed what is called an ICT Pedagogical Centre. This has led to a forum where teachers from both schools, interested in ICT, discuss and work together. The principal told us that this leads the schools to developments that they would not have experienced without the ICT

> centre. The centre is run by the vice-principal, and the ICT co-ordinator works with him.
>
> They don't work fixed hours for the centre. Often they go away to make presentations and train others, and to work with ICT support for others in the daily school work. The ICT Pedagogical Centre staff have travelled around to give courses on the use of educational software, word processing and spread sheets. This is causing disagreement among the teaching staff, creating at least one team that is opposed to the leaders and their opinions about the school's ICT activities.
>
> The principal is very strongly supportive of the vice-principal and the ICT coordinator. But as the leader of the whole staff he tries not to be the driving force in these activities. There are about 15%-17% of the staff that "see red" every time the word ICT is used, he told us.
>
> From time to time it has been very frustrating and difficult for the vice-principal and the ICT coordinator because they have been criticised for what they have been doing for customers outside the school, the principal told us. The principal clearly sees that there can be a danger that external activities attract the most competent persons in ICT. He told us that it would be very sad if these two people disappeared from the school, because they have invested a lot of resources in them.
>
> The two teachers we interviewed told us that the teachers have been offered smaller ICT courses, but there have not been very many interested in attending them. There has been some dissatisfaction. Some teachers on the staff think that ICT is used as a spearhead in profiling and giving status to the leaders and the persons involved in the ICT centre. Visitors from the outside come and tell them that they must be lucky that have come so far in the use of ICT. The teachers, however, don't feel that they are that advanced.
>
> What is interesting to note is that, as the principal told us, one of the teachers from the "anti ICT team", member of the local school curriculum committee, suggested that ICT should be one of the schools' strategic tasks. "They know that ICT is central, but they will not accept the way we do it today. It seems that some people always have to be notorious quarrellers", the principal said.

In this school, the control not only of computers, but also of their accessories, becomes an object of contention. The printer is a crucial tool, important for everybody that wants to work seriously with ICT in school. The two teachers interviewed explained that they were not allowed or able to operate the computer lab when H., the vice-principal and G., the ICT-coordinator, were away from the school. One had not at all been trained on how to get print-outs. The other teacher knew how to print out from the server because he had learned some on ICT on his own. The pupils interviewed from the two ninth-grade classes reported almost the same story. They could not use the printer when the ICT coordinator and the vice-principal were out for some reason. One of the pupils explained that H. and G. are the only people they can call on when they have an ICT problem.

The case of this school shows how the leaders of the ICT project were able to stay in control of the whole ICT situation and remain in a power position — all by simply controlling the technical facilities and by creating dependence on the other teachers to operate the machines. The real issue from the point of view of an observer is: was it intentional?

It is very clear that here it is not a case of teachers' aversion to ICT. It is much more a problem of power relations among teachers. What explicitly annoys part of the teaching staff is the instrumental use of ICT that a few of them are making, in order to gain status and power. To synthesise, the teachers' experience is that H. and G. are controlling access to the ICT, trying to obtain status for themselves and the school, and sacrificing their local school in the name of being considered as a competence centre from the outside.

On the other hand, H. and G.'s experience is that they do a good job obtaining local political support for ICT, machines, in-service training and after-school activities. What they should do is to persuade people of the value of ICT for school, and seek support from the outside to gain legitimacy for what they are doing. In relation to the reaction of the other teachers, they think it is because they are very unmotivated, not understanding what is happening and negative towards the leaders.

Another case showed us a far less-problematic experience of competition among teachers. In the case of O. (mentioned above concerning his relationships with the school principal), and his relationships with the other teachers (more or less technologically illiterate, but nevertheless involved in several ICT-based activities).

O. is in charge of the computer lab and has tried very hard to involve all the other teachers of the school in the electronic school network of which he is co-founder. He has organised (without being paid) regular seminars on Monday afternoons (every week!) for more than five years now, to train teachers not only from his school but also from all the other schools in the network, on word-processing, e-mail, and so on. During these seminars, they also discuss the most pedagogically interesting activities to develop, problems, achievements, etc. Participation in the seminars is absolutely voluntary. In his school, he has managed to gain progressively the participation of a high percentage of teachers. Some of them have become rather independent from him (or have turned their dependence onto their pupils). Others have followed him in the activities proposed but, declaring total incompetence in the manipulation of computers, they are totally dependant on O. 's availability to solve any technical problem they meet.

O. has become a central figure in his school. When he was a regular teacher, before having a transverse role, he taught a subject considered the "Cinderella" among all subjects. His status and power of influence inside and outside the school has increased tremendously. Although in his case, it is rather difficult to imagine that greed for power is the hidden motivation for O., it is possible to hypothesise that this could be the leverage for other teachers in need of an improvement of their status. In the case of O., it seems rather a case of devotion, energy and creativity, resulting in a charisma recognised both by teachers and children.

Surprisingly, the same behaviour shown by O. in his school context and environment is shown by H. and G., when they are outside their school environment. This should help one understand that problems are not dependant on the personal quality of people as such, but on the social interactions among the actors.

3.8.3 Relationships among schoolchildren: gender issues

One of the researchers of the consortium paid particular attention to gender issues. Are computers, as symbolic objects, used to perpetuate gender discrimination? Does this, in particular, have to do with the nature of machines, and as such as object intended for the male? Or does their "communicational nature" (as in the case of ICT) constitute a way to call for more "feminine" abilities and therefore reintroduce a balance in the gender relation? What is the perception of teachers in this respect? That of children? Here are some illustrations of these interesting questions which deserve specific research study in and of itself. However, the following examples can give some hints on the possible answers to such complex issues.

In some of the fieldworks, we observed a paradoxical situation: boys seemed to have a more proactive attitude in ICT-based activities compared to girls, whenever the problem of girls as a category subject to discrimination was explicitly raised, and especially in those cultures in which gender issues are a sensitive and widely established academic theme. In those countries, one should presuppose that gender discrimination is less practised than elsewhere. In other cases, sex differentiation before the screen was not so evident. This is an interesting element, which could be read in two different ways: either as a confirmation that sensitivity to an issue is the first condition for that issue to appear, or that defining a social category as discriminated through affirmative action is not a winning strategy; it can actually end up reinforcing and legitimising (negative) discrimination.

> ***Gender stereotyping under construction***
>
> In the school of ***, we have observed differences in the way boys and girls relate to ICT when they are challenged to develop competencies in its use. In a school setting where the role models in the use of ICT are primarily men and there is a lack of equipment for all, boys seem to be more used to competing for access to available resources. Boys' experience with ICT at home seems to give them an advantage.
>
> It also gives the boys reasons for arguing about gender differences in the uses of ICT and lays a foundation for gender stereotyping. Boys generally define girls as less competent, less experienced and, as such, less fit for tasks at school demanding ICT qualifications. For them this can be used to make it more legitimate for boys to deny the girls access.
>
> Although the principal had reflected on the gender issue and developed strategies to compensate, our observation was that it did not work. The teachers did not reflect on these issues in practice and did little to intervene. Even the obvious differences in the number of boys and girls as users of the Internet and the efforts to define the girls as assistants to the boys, did not evoke any reaction from the teachers responsible for the project work.
>
> It seems as if there is a need for a very strong framework, defining the activities to be performed by the pupils if gender differences are to be avoided in the school setting.

In this case, the attentive reader might witness an element of dissociation within the collective *we* of this report. Some of us might not interpret the usual antagonism between boys and girls as serious discriminatory symptoms. Phrases such as: "Girls are stupid in front of a computer!" or "The girls are not as competent in using ICT", could rather be ascribed to necessary developmental strategies of sex differentiation and identity formation at the adolescent age. Such statements could also been seen as symbolic "revenge" by boys faced with the average scholastic superiority of girls, or faced with the ostentatiously superior attitudes that girls often take in relation to them. In other words, when boys and girls deal with computers, they may not act differently than in any other school situation.

The correspondence of boys to male teachers' behaviours and girls to female teachers' behaviours, then, should probably be interpreted as the need for children and adolescents to find a model for behaviour which is appropriate to their own sex. As a matter of fact, computer responsibility did not fall systematically under the competence of men in the schools we observed.

However, in some cases, behaviour concerning ICT-based activities seems different indeed between boys and girls, as the following story shows:

> ***Boys versus girls?***
>
> The Media Centre seems divided into a boys' and a girls' part. Girls looking for books, asking the female teacher for help, reading books at the table between the bookshelves. Boys working in the computer area looking up issues on the Internet.

> The girls and the boys follow two different paths to fulfil the tasks assigned. Girls were very faithful to the teachers' suggestions of how to work, which included the use of books and sources other than the Internet. Boys see the Internet as exciting, school becomes fun, it is possible to compete and competition is important. Who finds more daring pages, who finds the biggest football stars? Some girls are following the same path as the boys. Most girls, however, like to work in small groups, talking with friends and slowly but safely writing what is required to finish the work. They also take responsibility for the group; the work must be done. Boys — even with the goals in mind, when technology and the new tools are there right in front of them for the first time — can't stop playing around.
>
> It seems to the observer that getting access to a PC is the most important thing for the boys. The boys don't care whether they use the time effectively or others get access. This is a situation where the learning, if there is any, is controlled by the drive to find and look for new things on the screen. It's clear that the teacher can be a guide, comforter and motivator. There is motivation in what the teacher says and does. However, this help and role was not needed when the boys wanted to explore the Internet on their own.

From what precedes we can draw a first line of interpretation: the different behaviour between boys and girls can be read as an illustration of their differences as to the way they relate to the need to achieve their assignments. With regard to this, the principal is developing an *ad hoc* strategy to put both sexes on an equal footing. She is of the opinion that school has to focus on the youngest girls. *“ If they don’t get the right attitudes when they are young they’ll never get it ”*, she said. She believes that the classical female role is the one that likes to write, cut and paste, and make it look nice. *“ What’s important is to make these little girls more curious, to make them work with the content ”*. Further she would like to focus on what the girls are good at: communication. *“ We’ve got to make more girls realise what ICT is ”*, she said.

But a second line of interpretation could also be drawn, based on territorial attribution. Relations inside that group of teenagers were such that an invisible "consensus" developed, which considered the computer lab mainly the territory of the boys. The girls left the ground even when they were very much encouraged to use the computers, as the following story suggests.

> ***Girls as special needs users***
>
> In the school of ***, the ICT coordinator and the vice-principal had the idea of establishing a special afternoon of Internet activities for girls once a week. They had tried all the time to get the girls interested enough to attend these activities. Their first goal was to get at least one girl from each class interested in searching on the Internet. But it was the boys that got their hands on the computers in the afternoons and evenings. The girls ended up not even having the chance to try a machine before returning home. They tried to do something about it by putting up lists, but the girls didn’t show up. The ICT coordinator has been around in the different classes to promote the new activity for girls only. On these evenings the girls can use the machines without having to pay. We have heard from the ICT coordinator that it has turned out to be a very popular activity.

Issues concerning teachers' relationships to the machines as affected by gender have also been considered. In one country, we observed that the initiatives of developing ICT-based activities were taken by women teachers (who were, anyway, more numerous in language teaching than men). However, the people in charge of the workshops, as well as the teachers in charge of the initiation courses to ICT, were generally men. Some of the women teachers reported to have felt a somehow "macho" attitude on the part of the instructors, who had troubles imagining that they could be suited to technical things. Could we then hypothesise a tendentially "feminine" attitude (or perceived as such) among women teachers, who would be more interested in ICT applications and their pedagogical aspects, by communicative and social/collaborative dimensions, as opposed to a "masculine" attitude, focusing more on technology as such? This preliminary role construction could just as well reflect an historical local occurrence. But, the following considerations of one of our researchers, as reported in his journal, indicates that in another school a differentiation of roles between male and female teachers was also observed.

> ***Women, men, and the sense of duty***
>
> What is funny is that the gender division is not really pertinent among children in the classroom regarding their interest in technology. It is with the teachers that you can see a difference: women are not under any obligation, men… under all obligations, in the end. As a consequence, when integrating technology in their practice, female teachers feel more at-ease than males, who are much more inhibited. Males are always put in position of proving something… this is something which has to do with our competitive nature I guess. As a result things are as if we (men) were taking more risks, and it is true in a way since a failure of a man in this respect will be much more criticised than a failure of a girl.

The points raised above would probably deserve a specific observation in itself, namely in relation to the "feminisation" of the teaching profession. Before making any generalisation, special attention should be devoted to the specific ideological and cultural context in which such gender-related issues take place.

4. CONCLUSIONS

Permanence and change in the world of education

4.1 Towards a new organisation of space

As part of our fieldwork, we had a specific task: to observe space configurations in schools in which ICT are used; whether there are special spaces for technology activities (a lab, for instance) or whether these activities take place in regular classrooms; the way the space is occupied, whether there are variations from the activities involving computers and those not involving them; the way children can move and talk in these spaces.

As we said, what we observed was of course a wide variety of experiences and approaches. However, some general considerations can be derived.

In primary schools, the traditional disposition of classes (parallel rows of desks with the teacher's desk in the dominant position, sometimes even on the "dais", an elevated platform) have disappeared. In some countries, that happened long ago; in others, it is a recent innovation linked to the new pedagogical approaches involving work by project, by contract, and by group. Computers (not many!) are more often placed in each classroom. In one case, they are placed in a single classroom, which welcomes the visit of those needing to work on them, without interrupting its on-going activities. What is important to observe is that it is a general practice and opinion that using ICT implies a challenge to traditional whole-class teaching. As one of the teachers told us, *" It is necessary to accept once and for all the idea that all the children will not do everything. Those who do electronic communication today will do a different task another time "*.

A teacher using Freinet pedagogical approach[1] (based on "learning by doing" and an extensive use of a printing press in classroom activity) is now forcing himself to change his pedagogy. *" Whole-class teaching is more comfortable from a teacher viewpoint (not only because it is the traditional way); on the opposite side it is more lively and educationally profitable when you are with four children working in a workshop. Anyway you cannot do the same type of work in these two different settings "*.

In primary education we mainly found classrooms arranged according to pedagogical principles and concerns. The following example refers to "classe unique": in some countries, in rural areas for demographic reasons, when 20 to 30 children from six to 11 have to be framed in a single classroom by one teacher, the teacher most frequently organises the classroom in different spaces where all the learners of a same instruction level are grouped. This arrangement is a classic one in this context.

> ***Reshaping classroom arrangement***
>
> The classroom space here is organised in groups of five or six individual tables plus some individual tables not grouped, plus the teacher's desk. Four years ago, the teacher passed from desks in row disposition to experimenting with a circular arrangement. *" Although better than the*

1 C. Freinet, Moderniser l'école, Ed Ecole Moderne, A. Colin, Paris, 1964.

> *desks in rows, definitely too limiting in pedagogical terms, a circular arrangement is not really satisfactory. It is as if you were always turning in the middle of a circle, and had to be the centre of attention. In addition, you always have at least half of the children at your back, so you pass your time turning and turning your head around. I'm not sure if it prevents you getting a stiff neck or if it is a way to get it. Anyway I survived!"* Since the beginning of the year they decided with the children ('on a décidé avec les petits') to arrange the classroom in that way. That is a classic arrangement of 'classe unique' *"The problem now is just that when talking to the class as a team, some of the children are obliged to turn on their seats to listen to me. In other words from now on the risk of stiff neck is more on their side"* she jokes.
>
> *"As for classroom organisation, I had a colleague who had a real "classe unique" in E. few kilometres from V. in an even more rural area than where we are here. A real "classe unique", that means 27 children from six to 11 years old and belonging to the five different levels of primary education. That is multilevel and multi-age. In spite of these a priori difficult conditions, he was performing well in using computers in his classroom, thanks to the organisation in workshops imposed by the circumstances."*

From the examples that we reported in the previous chapters, it is clear that the discipline of bodies is not so much an issue in the primary schools anymore.

In secondary schools, the situation is different. The fragmentation of subjects and of the responsibilities of teachers, the fact that spaces are visited by teachers for a reduced span of time instead of being permanently occupied, create a more rigid environment. Here, the most common solution we observed was the creation of a space dedicated to all the activities linked to ICT. In all cases there was a special room set up as a computer lab, with a clear frontier between the lab and the rest of the school. The lab is a special territory, in which new rules are in force. Even when the arrangement of desks and computers follows a traditional pattern, the norms regulating transit and concentration of children, the right to speak and the volume of voices are substantially different from the traditional classes. The lab is an open territory: anyone can come in without knocking at the door, anyone can talk loudly, no child is sanctioned because he/she leaves the assigned territory of his/her seat to visit that of a schoolmate. Other teachers may interfere, trespass what were once the sacred borders of the others' dominion. This is more true when an interdisciplinary approach is adopted in the development of learning activities.

This situation often creates two different "registers" within the same school context. On one side, the activity in regular classrooms: disciplined, individual, fragmented by subject. On the other, the activity in the lab: more flexible, collective, often multi-disciplinary. Is this another way to state indirectly the opposition between work and play? We are not sure. But it is true that for some teachers these activities have a different status.

4.2 Towards a new organisation of time

Another organisational question, related to the management of space, is the management of time, especially at the secondary level.

When children are in the computer lab, time seems no more a unique, linear flow imparted by the teacher's voice and rhythm given to the lesson. Time seems fragmented, extended, compressed in the different niches of the classroom. It is full and quick for the two children writing at the computer; hollow and slow for those waiting for some new instruction, or for the teacher in charge of the lab to help them. Perceptions of time differ strongly for those who are working and those who are not. There are many more "hollow periods" than during a traditional lesson. The management of time seems to become less a policing issue than a challenge to teachers' and children's creativity.

Classical standards for teaching periods have become definitely too short. The fragmentation of subjects, coupled with the fragmentation of time, poses more and more problems. We often observed the children interrupted by the bell just when they were at the climax of their concentration and their activity at computers. Furthermore, activities taking place in the lab are often interdisciplinary. The organisation of knowledge into parcels derives from the division of teacher responsibility, and consequently the time allocated to each of them seems totally inappropriate. In one case, the teachers involved have tried to organise themselves so they share the lab over two consecutive hours, to allow the children to continue their activity in the hour of another teacher involved in the interdisciplinary project.

Another aspect linked to time relates to the impatient side of the world in which we are living. Time is precious and needs to be filled in. "Nature abhors a vacuum", as the saying goes. And children do too. All the more do adolescents (and adults). Now, one of the main attractions of technology is precisely its ability to cancel time, bringing the "*then*", "*now*". But, we know, this is also a marketing argument. In everyday experience this enchanting promise has to be confronted with the triviality of occurrences and unforeseen events, as the next short story shows.

> ***Patience and... disappointment***
>
> Four girls and one boy were impatiently waiting for their print outs. It didn't seem to print fast enough! This created noise. 'Working with the Internet may cause a lot of waiting as you can see' — the teacher told them. He often raised his voice to make the pupils calm down. It didn't seem to work. The work was not very efficiently planned, but although the pupils had to wait, they were still very keen.
>
> First experience of using the **Internet**: a great disappointment. Teacher was very excited about getting on-line, had never seen it until she got it. On the first try she found something she wanted to download; it would take 20 minutes. She started it off and then the computer crashed at 19 minutes 37 seconds! She contacted the adviser who said, why did you try? You've only got copper wires. It's not possible with that technology! But how was she to know?

One might also question at this point whether the long times sometimes imposed by the imperfect stage of development of technology do not have, after all, a pedagogical value, which should not be underestimated: learning patience. And humility.

4.3 Towards a new definition of the locus of Authority

One of the questions we asked ourselves before starting our observations was whether ICT had an impact on the distribution of power between the various actors in the school environment. We wanted to see whether, and to what extent, the dynamics of relations were modified by the progressive integration of new communication technologies into pedagogical practices and organisational structures, and if so, how. We can argue from our observations that the implicit injunctions instituting power relationships and conveying the legitimation modes of authority do seem to be changing inside the classroom.

In order to be integrated effectively in school practices, ICT seem to oblige school operators to rethink the power structures regulating the school order. Avoiding to do so, struggling to maintain the traditional prescriptions and hierarchies, minimises the pedagogical potential of ICT and engenders dysfunction and frustrations among children and teachers. The introduction of ICT seems to call for new (explicit and implicit) rules regulating the relationships among the different actors. It also calls for a rearrangement of the apparent and implicit knowledge they ought to master in order to feel and be recognised as members of the school community.

We saw that the way in which space is occupied by children and teachers when they are using ICT is different from traditional classes: freedom of movement, possibility of choosing neighbours and consequently companions of work, and of talking freely. Helping each other is a rule, not a sin, as in traditional classrooms. The inviolability of the classroom territory is radically questioned: the teacher seems to be no more the only "Lord" in his/her kingdom. When the lesson takes place in the lab, the territory is often shared with the "technological operator", on whom other teachers depend totally for the operational aspects of technology. The lab is an open territory: anyone can come in without knocking at the door, anyone can talk loudly, no one is sanctioned because he/she leaves the assigned territory of his/her seat to visit that of a schoolmate. Other teachers may interfere as well.

The vertical power structure is radically questioned: there is a decentralisation and a multiplication of micro power structures, having different spatial and temporal configurations.

Using ICT can be an element that disrupts the traditional relationships between teachers and pupils. In a few cases, we observed an attitude of dismay in front of the loss of control, from which teachers defended themselves either by invoking their protective role *vis-à-vis* pupils, or by preserving their control position through the establishment of formal rules and sanctions. The formal rule becomes the guarantee of the power position, and consequently of order. We observed, on the other hand, cases in which teachers found other ways to exercise their control over class activities: that happened whenever they conceived their role more as that of supporters and guidance to the children's learning, of organisers of activities; sometimes they even perceive their role as "mothers". In these cases, the action of teachers was more passive, backstage, and emphasis was placed on the pupils' autonomy. We finally had some cases of children training teachers, and teachers feeling comfortable about it.

There seems to be a fragmentation of the main *locus* of authority (formerly the teacher, as incarnation of the institution) and a multiplication in several *loci* scattered inside and outside the class. It was particularly evident in those circumstances in which some of the children were called to play the role of the teacher, because they were more competent than the teacher in dealing with computers. Their competence was recognised by the different teachers, who could accept more or less easily to yield their once unquestionable monopoly as "knowledge dispenser". The more participative attitude asked of children, the more active is the role of production of knowledge on their part and consequently the acknowledgement of their status as depository of knowledge. Hierarchical distances are shortened. Furthermore, they may be turned upside down and their legitimacy no longer reside in the institutional investiture.

All this is made possible only if a system is flexible enough to put the learner at its core. The presence of a computer in a class changes nothing in itself. The reorganisation of the legitimate depositories of knowledge takes place only if the teachers do not feel threatened by their apparent loss of power. It requires a system based on a principle of lateral collective power, as opposed to a system of vertical top-down domination. Redefined, it is a system willing to encourage children's self-reliance as opposed to their infantilisation, leading teachers to take into account the possibility of losing their monopoly and their place as the only source of knowledge in the class microcosm.

But if the system is not ripe for that, one should not worry: the presence of a computer in the class is no more threatening than the presence of an encyclopaedia, or of a typewriter.

Another dimension affecting the new definition of the *locus* of authority is linked to cooperative learning. The configuration of legitimate communication flows in the classroom seems no more to be bi-directional, going from the teacher to the children and from each child to the teacher. Micro-teams are created around problem-solving and are encouraged to co-operate to seek common solutions. Sometimes, this might also be a consequence of the lack of adequate numbers of machines. But it has several implications as far as the children's assessment is concerned. Their performance is no more assessed as a *solo*: the way children relate to one another is (more or less formally) evaluated, as well as their ability to tackle a problem within a team, and in relation to that team.

We observed that the anxiety of performance can be considerably diminished and that this seems to encourage the expression of the children's creativity. In some cases, it led to the revelation of unsuspectable talents. Working in teams does not blur the individuality of each child. On the contrary, it might be a stimulation for each one to seek for one's own role, to highlight one's own specific competencies and to have them acknowledged by the team (and by the teacher). But this process needs to be managed carefully by the teacher, who is called to defend the delicate balances generated in the process and to firmly discourage any attempt of domination or stigmatisation of what might be defined as a sign of inferiority.

Collective work might also demand from the teacher a higher tolerance for moving and noisy "configurations" in the classroom. It means also that the traditional rules of in-class dialogue might have to be questioned and abandoned. Sometimes, to minimise the noise and chaos which might derive from the exchanges, emphasis is instead placed on the children's self-organisation and self-control.

Finally, we would like to develop some considerations on the changing implicit injunctions to children and how these affect the *locus* of authority. In some of the schools we observed, new injunctions for a tacit encouragement to the children to self-regulate their participation in the classroom, their movements in space, their management of time, seem to have replaced the traditional ones. "Be silent", "Do not move!", "Learn by heart", "Do what I tell you to do", "Do not cheat!", "Do not copy from your neighbour!", "Talk only when you are allowed to!": all these injunctions implied that children must learn a certain behaviour in order to be accepted as members of the school community. These injunctions also first and foremost implied the assertion of certain values and power configurations.

There is a new trend: children are asked to perform in relation to their classroom community (as opposed to a formal rule). They are asked to consider the needs of the group in which they are placed, not to obey because the one who embodies the institutional Authority is ordering them to do it.

4.4 ICT and the QWERTY syndrome

Educational systems are in transition all over Europe. What we discussed in earlier chapters introduced most of the themes for the transformation of the school agenda. However, and it is important to stress it one more time, the mere presence of computers is not the agent of change.

The way educational technologies are introduced in school can sometimes be an illustration of what Papert defines as the QWERTY phenomenon[1]. The QWERTY phenomenon describes how the use of new technologies is still perceived through the "lens" of technologies that are old: there is no technical reason to keep the QWERTY sequence on the keyboard. They do not jam anymore and it is now useless to reason in terms of how frequently a letter is used next to another). "On the other hand, if you talk to people about the QWERTY arrangement, they will justify it by 'objective' criteria. They will tell you that it 'optimises this' or it 'minimises that'.

1 S. Papert, Mindstorms: children, computers, and powerful ideas, op. cit., pp. 32-37.

Although these justifications have no rational foundation, they illustrate a process, a social process, of myth construction..."[1] Similarly, we could say that computers are sometimes introduced in school as if the fragmentation of knowledge into specific subjects still had a rational foundation: children should learn how to manipulate them, as they have to learn history, math, sciences...

Such thinking illustrates a misunderstanding of the nature and potential of computers as mobilisers of different ways of learning. Including computers as a "subject" in the curriculum reveals first of all an overestimation of the technicalities of computers, which deserve to be learnt in and of themselves, independently of any integration into wider pedagogical objectives. Second, it reveals a choice in favour of one and only one learning style, the "planner" style as opposed to the "bricoleur" style. The "planner" style has historically dominated schooling. To see it reintroduced for ICT use in school is the perfect illustration of the QWERTY phenomenon. It is as if computers were piling up over other chunks of knowledge.

In order to avoid such anachronistic practices, we believe that teachers should in the first instance be "bold and daring" in their use of ICT. The reason is that there is no infallible recipe to use ICT in school, but there might be an infallible recipe to kill ICT in school. Whenever there is too great an opposition between the medium and the method, and whenever ICT is used in a teacher-controlled environment, there is a strong risk that teachers and children alike will be discouraged. Institutionalising computer learning may result in a serious undermining of their extraordinary potential. As John Holt once said, "mathematics and science would probably be learned better if they were made illegal."[2]

Teachers and children should be given the time to undergo transformation. No imposition of "law and order" will circumvent that. How many centuries did it take to understand that the written text was a good medium for the dissemination of literary art? Why should school (and the rest of society hurrying to blame schools) already know what computers are good for? School is a relatively old social institution, which has served more or less honourably its times, and done so in a protected "environment": its existence has barely been questioned and no alternative has ever seriously undermined its existence. To change, it needs time. It needs the building up of alternative models from within, which do not jump over the cultural and social characteristics of the environment in which school is situated.

The introduction of computers in school is making some of the changes already visible. In some of the cases we observed, we noted a deep transformation affecting the traditional hierarchy of subjects and competencies: the ancient supremacy of logical-mathematical abilities over manual, relational and organisational abilities seems to be shaken and put into question. This is linked, of course, to the new central role of the learner and the need to work on his/her attitudes as opposed to *" conform to the standard of the good student and good citizen "*, as one of the teachers we interviewed said.

These transformations are taking place in a fairly harmonious way, especially at the primary level. It is often the case in secondary schools, however, that the coexistence of old approaches with new ones creates a contradictory, if not schizophrenic situation. We saw that the organisational complexity of secondary schools, the fragmentation of subjects and responsibilities, the complexity of the relationships among the different teachers, their specialisation and the hierarchy of subjects seem to impede the adoption of more flexible approaches.

In this changing landscape, the role of the teacher is also evolving. We already mentioned the shift from a directive-prescriptive role to a more supportive/organisational one. In our interviews, teachers often defined themselves as learning "facilitators", "supporters", "assistants". While in some cases this seemed more a fantasy than reality, in other cases, the

1 S. Papert, ibid, p. 33.

2 Reported in A. Kay, "Computers, networks and education", art. cit., p.146.

space given to collaborative learning among children and to children's autonomy, gives substance to the definition one teacher expressed:

> *... the teacher's role? (laughing). Once he could be a mediator, because all knowledge was mediated through him. Now, it is no more the case. He certainly is a support for children, a support for knowledge, an adviser... Here are some key words for my pedagogical approach. First of all, tranquillity, which seems such a little, unimportant word and instead... It is important that children come to school without anxiety. The second word is expertise, on the teacher's side. Third word is collaboration, among children and especially among teachers. It is clear that when teachers collaborate, it becomes much easier to have a serene and tranquil dialogue with children. And, finally, vivacity. What would really make me sad would be monotony and repetition. We need to innovate from one year to the other, because children are different, the situation is different.*

Technology comes to play an important role in the transformation of values in educational systems, both as a revealing factor of implicit positions and as a stimulus for questioning important organisational changes.

4.5 Top-down wires and bottom-up ideas?

Policy-makers are unanimous: the use of ICT in school is a necessary step to prepare the new generations for the advent of the Information Society. Several initiatives are or have been undertaken by political authorities at national, local and European levels. But whereas on one side, a lot of initiatives are proposed and are (or are going to be) financed, there is a counter-movement in the sense of restriction of funding and austerity, of reduction of school buildings, of suppression of whole classes, at least in some of the countries covered by our study. The quality of education is jeopardised because economic criteria are invading the educational sector, even when it is largely dependant on the public system and inspired by the principle of accessibility for all. It is too often by a simple calculation of numbers that decisions are taken as to who should survive and with what economic resources.

In some countries, we might soon have the paradox of having all schools equipped with computers and wired to the WWW, but with no money to buy pens, chalk, or to pay the telephone bill. Or having the schools equipped with the wires but with no ideas to circulate through the wires. Technology as a fetish for (post-)modernity...

We already mentioned the tendency to attribute the slow up-take of technology in school to the conservatism of teachers. This is a myth which should be put into question. In the cases we observed, teachers, with few exceptions, are close to missionaries and fighters struggling against numerous barriers: the blindness of the bureaucratic machine, salaries frequently in the lower range of national scales, feelings of a great responsibility towards the children they take care of, having to solve the organisational problems that no public decree can solve (will the importance of organisational requirements *vis-à-vis* schools and the integration of ICT ever be adequately emphasised?)

We do not think there are many possible ways for policy-makers to take these crucial factors into consideration. They need to be in touch with the reality of the field, analyse the structural problems that decades of low investment in the educational system have left. They need to reflect carefully before taking spectacular decisions, that result only in the warehousing of soon-to-be obsolete material in schools for the next decade. In many schools across Europe, hidden in cabinets and basements, one might discover technological time capsules — testimonies to such grandiose decisions. Before planning a large-scale investment to equip all schools with computers and wires, policy makers should capitalise on the experience and potential that some local educational communities have developed over the years.

Many experiences have started in the field without public money, but out of the intuition, the obsession, certainly the devotion of teachers who engaged themselves in a learning process, together with their pupils. These experiences need to be exploited and expanded. People in the field understand (or are in the process of understanding) that the meaningful integration of technology in a learning environment (as opposed to a cosmetic introduction to "modernise the façade") is only partially a problem of equipment. This does not mean that technical competence is not important; but the real question is how to cope with the new organisational requirements that technology, by its nature and potential, sets as a condition for its sustainable development. The challenge is to ideas for developing interesting and pedagogically rich uses, and to find the convenient organisation for them to bloom.

The most active teachers in the field seemed to us on the verge of despair: technical and institutional conditions remain fragile, all the more so since these teachers are, as is often the case, active in several fields (information and communications technologies, their academic discipline group, etc.). In situations where schools or their teachers have less control over decision-making and resource allocation, or where there was inefficient bureaucracy, we found committed teachers close to collapse.

In some of the cases we observed, teachers financed equipment with their own money. In contrast, other schools of the same area were wired by the institutional authorities, receiving equipment that almost nobody used. Here we find the same phenomenon of administrative top-down "innovations" (which do not materialise) and bottom-up initiatives (which do not find support). How to break this bureaucratic *chassé-croisé*[1] in such a way that policy-makers meet local school leaders? Our hope is that this report may provide a preliminary meeting ground.

1 Chassé-croisé describes a situation where people systematically miss each other by turns.