étude de l implantation des TIC et

de divers perfectionnements éducatifs

mis en Suvre

au lycée Marie Curie d échirolles

(près de Grenoble, France)

Étude de terrain réalisée en Juin 2000

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General overview

The Marie Curie HS d échirolles (close to Grenoble, France)

History and current situation

The high school of Marie Curie was created in 1990. It was considered from the outset as experimental in ICT and pedagogy. One director and 12 teachers under him (centred on ICT) formed the core of departure, they worked during the year of 89/90 before the school actually opened and so had a say in the architectural conception and choice of technical support for the networks. A pre-cabling of fibre-optic cables at the outset with 250 PCs connected to this network of 13 servers.

The school opened in 1990 with the information network already in place. Since then the network has been redone in 1998 due to malfunctioning caused by broken connections from a nearby tramway system. 12 million French francs were invested by the region at the outset of the project and 3 million francs reinvested to the update.

These conditions are exceptional for such a project, and this establishment is thus a pilot project, even though after 10 years it has proved itself and evolved from the experimental stages.

Situated in the country South of Grenoble, originally surrounded by fields, it was quickly engulfed by the town, by the sourthern conglomerates of Grenoble: échirolles, Pont de Claix, Eybens, Champagnier, Bresson, Claix, Varces, Saint-Paul de Varces. The high school serves the students of 7 colleges, of which 3 from a priority educational zone. (zones w2ith high density of underprivaledged).

The school has the capacity for 1680 students preparing for their general and technical baccalaureates, with a baccalaureate in applied arts and a BTS Force de Vente. (Bac + 2 years technical superior) There are actually 1350 students (55% girls, 45% boys), very few foreign students. Mixed social milieu social from employees and executives.

Figures of repetition : around 15 % in 2nd ; 5 % in 1st and
80 % success to achieve the baccalaureate, which is an average for this type of establishment.

There are 120 teachers, 25 admin and technical staff et techniques all of which are permanent staff.

There are annual general assemblies and weekly disciplinary and interdisciplinary meetings. The staff is relatively stable.

In order to make the new students in the 2nd at ease, a visit to the mountains is organised with teachers, this is an occasion for new students to learn the school rules and integrate in the school policy.

Presentation of the project

The *projet de l'établissement* is not the centre of new technology but rather a tool towards achieving new pedagogical objectives. The project is based on 5 themes :

1. Acquisition methods of working,
2. Tutoring for 2nd grade students,
3. Group work and meetings of pedagogical teams with educators
4. Quality of school life,
5. Opening of school towards outside community.

ICT was thought of, constructed and used in this establishment from the outset.

1 Acquisition of working methods

- Give to students a diversified training methodology, adapted to higher education and the working world.

2 Tutoring for 2nd grade students

This aid to students in the 2nd grade is part of the framework of the License to Succeed of the region.
Two tutors for each class have the role to :

- Listen, advise and help students with difficulties,
- Practise positive orientation to aid students to adapt to their courses and personal ambition,
- Develop a pedagogy by objective in line with the students own ambitions.

3 work in groups

Working in groups revolves around meetings, training and communication :

- inter and intra-disciplinary meetings (1h of course time is liberated for meetings),
- Information pedagogical team and administration
- Group development (amphitheatre, doubling up, working in groups),
- Reciprocal training due to sharing experience, learning technology use in the high school,
- Definition of common progress and evaluation criteria common to level and content.

- The composition of educational teams comprises , educational personnel, orientation, documentation, teaching, school medical, social school workers, teacher/parents to help students define their goals, assure students are followed and prepare their class evaluations.

4 Quality of school life

- ensure convivial rooms for the students,
- avoid maximum of thieving, racketeering, violence...

All staff share responsibility of adherence to the rules of the school.

5 Opening of school towards outside community

- Inform parents of school work to obtain their collaboration,
- Collaboration between colleges of the region and high school(information, visits...)
- Information on branches and hiring (with links to teaching establishments of HE - conferences etc.) ,
- Knowledge of professional world (training in companies, reception of professions, conferences, etc.) and propositions of contracts with companies and the school,
- Partnership with local organisations such as sporting clubs and cultural establishments,
- Preparation of students for exchange programmes, university study and European employment,
- Preparation of students in technical written communication, oral and technologies in professional world,

Project aim

- Make teachers more dynamic,
- Federalise efforts,
- Develop collaborative work.

Budget t

Total school budget: 7.642 Millions French Francs

Sources of revenue :

- Regional subvention
- family donations for restoration
- diverse subventions

Other important resources available (e.g.. voluntary monitors, research of funds by parents and teachers) :

- Learning tax (paid by various companies): around 0.3 million French francs
- participation of parents in the *Foyer Source Educatif* (around 0.1 million French francs)
- 2 youth employees
- 3 solidarity employment contracts (CES)

Computing equipment

The computing area at the school is large in comparison to other medium sized high schools :

250 computers, 5 servers, 3 scanners, videos, mounting, video projectors in the amphitheatres, a router, video communication/conference facility and EXAO equipment with 30 interfaces.

Installation of the computing area

- Around 30 rooms equipped with computers
- 7 computers in 5 practice labs
- One multimedia language lab (20 terminals)
- 2 work rooms with 15 computers in each
- 10 computers in library
- Around 80 computers in 5 tertiary rooms
- 4 computers in the applied arts room
- All classes have television,
- 5 rooms with video projection,
- Each computer is hooked up to Internet thanks to the server. In addition, there is rapid access to Internet in all classrooms (at least one Pentium over 486 capacity)

- Three separate networks house (general teaching, tertiary administration), which reveals the different historical and cultural profile between the teaching teams, the students in tertiary have office courses integrated into their courses and have to pass computing tests for their baccalaureate.

The C.E.M.I. *(Commission d Equipement en Moyens Informatiques)* Equipment Computing Commission holds meeting and gives advice on choice of equipment.

Intranet

The intranet is in existence for 2 years used for:

- Pedagogical instruction,
- Des productions less formal and creative pages (games pages, drawing , music...),
- Searching pages,
- Classifying links with comments.

See annexes/computer screen examples.

Internet access

Internet is accessible on many of the school terminals:

- Staff room terminals
- The 5 library terminals (used uniquely for document research),

- The terminals in the self service lab (during open hours and by the computing club),
- Terminals in the tertiary teaching room

The school portal orientates towards certain selected sites by the students with a category Work and also things like music and games .

E-mail

70 % of teachers possess an e-mail address, and practically all administrative staff. All teachers can get an e-mail address from the academy.

Students can have a school e-mail with the authorisation from their parents if under 18 years of age.

15 % of students have their email at school but personal addresses is not known.

School website

http://www.ac-grenoble.fr/webcurie

The site is maintained with school personnel resources, the aid of an educator and 24 members of computing clubs.

Diffusion and computing skills

Technical and pedagogical innovation

The innovation process at the Marie Curie school is both technical and pedagogical, so that it is difficult to distinguish between the two domains. For certain players, the innovation was firstly technical (general utilisation of IT) and then pedagogical. For others the process of innovation was firstly pedgagogic, to the point that computers are unneccessary for carrying out such a project.

New competencies

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The history of the school and the innovative project process, together with the number of computers made available to carry it out brought about a favourable climate to incite development of computing practise.

For the administration and teachers, the availability and use of computers is widespread and necessary for the logging for example of absences and the trimestrial scholarly bulletins which are diffused via the intranet of the school.

A two-day training course is organised just before the start of the school year and favorises use of IT, notably for new teachers to the school.

For teachers, the intensity of computing practise varies according to the place on the hypothetical ladder i.e. those qualified in computing to those who resist against computers. Only a minority (around 20%) don t use IT in their teaching for several reasons :

- afraid of computing,
- unfamiliarity with pedagogical potential of tools,
- difficulty to use material (such as lacking keyboard skills mouse or Windows system),
- afraid of student superiority in computing domain,
- Refusal to undertake in group projects (due to more than one student to a machine),

- new trend effect which could destabilise the teaching body who are accustomed to the omniscience of their knowledge.

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For students, the use of ICT is widespread, and just about obligatory if they partake in courses using these pedagogical resources. If the student use appears homogeneous, there are differences in intensity of use, which are due to motivation, personal equipment available, personal investment (such as belonging to a computing club) or training. Only the STT sections (see also applied arts) are obliged to work on computer and have knowledge of certain applications specified in the official programme.

Globally students judge the quality of equipment and regret no general training on ICT tools. The variety of programmes and pedagogical practises used by the teachers is large. The web access and school intranet is accessible from practically all the machines. The students use the terminal within and outside their courses, the nature of IT use is thus varied. We can observe three types of utilisation:

- Pedagogical work (exercises on the computer or consulting various resources following teacher s guidance),
- Personal resources (for example students have a private territory on the servers,
- Hobbies.

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Common usage tendencies

The pedagogical computer uses are partly due to the common tendencies of the establishment :

- Absence of systematic use of e-mail for communication purposes (even if all have possibility to open an account on the academic server). Only 15% of students have an electronic address on the school server.
- Practice of pedagogical resources on intranet of the school, and more recently on the web. This is the editorial work of investment by some teachers and more generally a process of which has been brought about by the students, for which this practise is integrated in a pedagogical process (e.g. the summaries made of T.P. and S.V.T. and the diffusion of the economics course) .

Factors of different uses

The repartition of the field networks into three categories : administration, general teaching and S.T.T. (without taking into account applied arts). The physical repartition of the school resources reflect a territorialisation of network infrastructures and, eventually different pedagogical applications.

The type of application used in each discipline : in certain disciplines (SVT, maths for example) they appear in the national programme (notably in SVT, physics or the intranet of the school is rich in applications made by certain teachers, not-to-mention the utilisation of specific interfaces such as CASSY-BIO). In these disciplines IT is a strong means of stimulation which permits modification of classes. In the applied arts, the installation of Adobe on the MacIntosh computers appears the reference point in an area of creativity. For the teaching of spoken languages, multmedia rooms replaces the traditional audio labs. In other disciplines, the pedagogical editions/sites on the web dominate (economy, history/geography, philosophy where a site made up by a teacher has gained a

certain notoriety). In literary subject the use of computers is less general.

Training

Teachers : The internal policy of the school has not allowed for training in ICT and its pedagogical uses, except in S.T.T. Teacher benefit from a short training just before the school year begins **but their essential knowledge is gained outside.** Some teachers seem to have ICT competence but do not see how to exploit it for pedagogical benefit.

Students : The problem is identical, notably since the rectorat ended the initiation course in computing. The training of students in ICT skills is informal and essential acquired over time in their courses. Nevertheless, there is form of cooperation and aid between students in the self help room for example outside of courses.

For teachers as for students, the **acquisition of competencies in ICT depends on usage of home computers and personal investment.**

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Demand for training: For the majority, training appears to be a necessity as technology evolves so rapidly. Regular training on a permanent basis in pedagogical usage of computing would permit easier management when confronted with incompatibility problems, different versions of applications and to avoid too rigid routines and exploitation of tools which occurs when teachers are untrained. Liberation of teaching hours is necessary to invest in initiation, maintenance and creation of pedagogical applications. With regards to the size of the computing area, students and parents underline that there is not enough personnel to manage it.

IT tools : ends or means ?

The place of ICT is considered ambivalent by the users. Apart from S.T.T. where it is written into the programme, it is considered by the teacher as a means towards pedagogical renovation, whereas to parent and students it is an end. For the latter, ICT is an indispensable, modern tool and to study in a numerical school serves as window to the world.

Renewal of formats and pedagogical practice

Quality of school life

The quality of dialogue is an argument which most of the school argues enhances the atmosphere in which they work, and the absence of damaged material reinforces this impression. To this end the following arguments are put forward :

- Teachers put forward a ruling discipline for the establishment and the relation to the pedagogical quality,
- The parents of students underline the school s reputation and its success rate in the Baccalaureate (80%),

- The administration mentions good contacts with students and relations with teachers,
- The students appreciate the quality of equipment and the motivation and competence of their teachers and the majority agree that they are in the school that is human, and regret that the recent radio project has ended.
- We can speak of a veritable school culture, based on a voluntary politics and a group of pioneer teachers who started the project 10 years ago and exert a sort of leadership role today. The teachers are incited to participate in the process of innovation, due to the strong presence of computing equipment in the rooms, a team of teachers and motivated persons to which the *project détablissement* fostered an innovative conduct of usage

The role of pioneers in the method of diffusion

The diffusion was a cascade process begun by the head of the school (who guaranteed the realisation of the *project détablissement*) in turn helped by a team of pioneer teachers (one of which is the network administrator) and then those who maintained the technical aspects of the system (one of which was a youth employee) to the rest of the teaching body. Apart from resistance by some reticent teachers to all aspects of computing (and also all other pedagogical change), it can be noted that the team from the start was largely renewed and that the pioneers and their specific profiles were therefore just a core group in the mass.

The process of innovation seems to rest for a large part on the rule of the key players who accumulate diverse functions in the school : teacher, C.E.M.I. member, ICT trainers, volunteer, network administrator ... recruited from the outset by their professional qualifications. These teachers prove themselves by their engagement in work for which they are paid. Their competency in their respective disciplines and pedagogical use of ICT, and are militant in their claims of the benefits of ICT in pedagogical renovation. Their competencies are such that their historic role was so determined it is unimaginable how the process of innovation at Marie Curie could continue in their absence.

Institutional format

The pedagogical exploitation of ICT and the process of renovation that accompanied it, questions the traditional framework of school teaching. This is the case, notably in the **validation of competencies in computer skills** for which there is no place in the official education programme (besides S.T.T.). As the teachers remind us, ICT is still today largely considered a peripheral pedagogical resource, even if at Marie Curie, it forms the heart of the *projet d établissement.* Teacher at the school stigmatise the rigidity of the national programme and evaluation and reproach the fact of inadaptibility to the contemporary world.

The **format of traditional classes** is too strict rhythm of group learning, the manpower, the schools regime of hours rhythm of collective learning, the workforce, hours/timetable and personal mode of evaluation. Even if the use of ICT obliges to take into account the personal rhythm of working, the development of autonomy (for example to undertake document research or edit resources as part of the pedagogical project led in the classroom by the teacher) and, eventually, to take more account the evaluation of students group work (cannot take place as students have to work in twos at terminals). An innovative pedagogical project based on the utilisation of ICT challenges the concept of time and common space of the traditional classroom.

The redefinition of the teaching role

A number of persons which to see the **redefinition of the teaching role** in the framework of the school project. To be a teacher, is not simply to give a course for 8 hours per week it is also to learn new tools, devise programmes, participate in the development of resources and solve technical problems : considered to discouraging chores for some who can only take into account a management system and evaluation based on course hours. For some teachers the liberation of teaching hours does not correspond to their personal investment in reality.

Pedagogical methods and scenarios

Tutoring / follow-up. A pedagogical scenario of tutoring is inscribed into *the projet d établissement*, but the putting into place of this is difficult as it requires an investment on the part of teachers.

The distinction made by some between technical competence and pedagogical competence. In SVT and in mathematics, there are pedagogical applications in place, but in other disciplines, the teachers do not see how to use or devise specific applications. For them knowing how to use a computer is not synonymous with knowing how to use the computer for pedagogical ends. (a remark made by those who are computer competent).

Pedagogical methods and scenarios *(suite)*

The strategy of editing of pedagogical documents (course   mémoires , student summaries). In SVT, in certain courses like History /Geography and Social Sciences and Economics, the utilisation of ICT is in the form of course mémoires, which are resources (resumes) made available on the school Intranet. These are done by the groups of students assigned to this role. After teacher correction, they are copied onto the Intranet server. This practice does not appear to exist for other courses.

Towards new more productive cooperation ?

Common means of cooperation between teachers. This should be one of the consequences of utilisation of ICT, at least if one follows the official speech of the Provider (and the *projet d établissement*). Nevertheless, the process of common pedagogic means begins effectively with a coherent pedagogical effort only in SVT (and a little in History/Geography). In this case only, the introduction of ICT translates by the production of common course support and exercises which the teachers share. The process appears to largely favour the existence of dedicated applications of the common interface such as CASSY-BIO. In other disciplines, this does not appear the case, one can note the localised experiences (philosophy, social sciences and economics). Languages also have multimedia labs.

The network and   better productivity (common SVT exercises). For this the purely pedagogical aspect of the process (notably in SVT), the provider and the pioneer teacher group advance on the main theme of better productivity, notably due to the usage of the Intranet which permits common use of resources. In reality, these are the work of one or two teachers (volunteers) which are used by the rest of the pedagogical team (and this, only in SVT).

Student implication in the ICT project

The majority of those interviewed consider that the students feel implicated in the project. Three elements are judged as symptomatic of this implication :

- good Baccalaureate results (80%),

- good relations between students and administration or between students and teachers
- the motivation of students in the tasks that are confined to them (notably individual work, essentially exercises to do at home and document research to prepare the expositions)

Certain actors insist on the fact that these positive elements correlate in function with the level.

In the terminale grade (last year of the baccalaureate), the main work of the students is they type of specifically towards completing their baccalaureates and which leaves little room for ICT use and the participation in these cooperative and innovative projects. It is in the second grade, on the contrary that the use of ICT is the most visible in view of benefits as stated in the programme. This leads to the belief that programmes constraints and examination results should be lessened so as to make time for investment in new pedagogical ICT-aided .

Lastly, some mention the fact that for a minority of students (few in number) did not serve to resolve certain disciplinary problems.

Students and web usage : what benefit ?

The principle of developing **student autonomy** (learning to learn) is a difficult parameter to make observations. The process of individualisation is very limited in certain disciplines such as SVT, and suffers from the weight of the national imposed programmes. On the other hand, the element which affects all the players is the opening of the establishment to outside networks, notably the web which focalises all attention. Many view a citizen-orientated education, an opening to the world equivalent to that of a universal library..

Web usage appears very general with students, less with teachers (for example little practise in bookmaking of interesting sites by discipline).

The school Intranet and the web coexist without articulation. Non-school web-searching is tolerated on the whole, including in certain courses (see observations in the SVT course) and this favourises the curiosity of students. Some mention nevertheless unguided use of the web a risk to students who are unable to exercise a critical judgement of information. This phenomena is evoked by two teachers and by the Provider. In SVT for example, this self-learning appears realistic.

The role of the student expert

Outside of the SVT course it appears that there exist the **phenomenon of helping each other** (technical help) and the eventual collaboration of knowledge of competencies when teachers assign a precise task to a group of students to make course summaries, prepare presentations). The utilisation pedagogic of ICT can lead to specialisation in the case of certain students in assistant technical tasks or even in the increase of pedagogical resources. (they are always the same which participate, notably those which are most implicated in the computing club). This leads to others becoming passive and one person interviewed referred to this a takeover of power .

Which types of students benefit from ICT ?

According to the players, **the utilisation of ICT and pedagogical activities of which the** *projet d établissement* **benefits two types of students : the good students who are good even without ICT and the less good students (atypical) who habitually have more difficulty in personal motivation within the school.**

For the others, the project does not appear to bring more significant elements in particular, if there are not good relations between the administration and teachers. Some do not hesitate to invoke the parameter of personal equipment (the usage of ICT at school is even more positive when the student possesses a home computer, especially if also hooked up to the web).

Concerning students it can be said that (according to our research) that they are sensitive to the principle of the availability of equipment (rooms with self service computers, computer clubs and even classrooms open to demand). Another element they have the impression to actively imply in the life of the establishment and in the pedagogical activities.

Conditions of maintaining the ICT project

Maintenance cost

Money remains key to the maintenance of ICT in the school, even with important motivation support of the teachers and administration. Even the role of certain volunteer expert participants who are passionate in their contribution cannot guarantee the maintenance and updating ... and the teachers using ICT are bot all passionate and ready to give of themselves. They demand the means for the cost of the annexes upkeep.

The equipment

The conditions of ICT maintenance is put first above the choice of basic material, and network cabling.

In effect, for a project such as this, it needs to be based on a solid reliable cabling, which does not have to be redone annual, which takes up much time and cost.

Basic, costly equipment which is not much used (such as video-conferencing) and equipment which is heavy on upkeep should be avoided.

Technical budget
- The introduction of ICT cost 15 million French francs in total of which 500 million French francs were unblocked by the region to renew machines and200 million French francs were invested in funds.
- The maintenance amounts to 150 French francs per machine per year, if done inside the school. .
- New software and renewal of specific material must be added to this.
- Obtaining the necessary budget has to be constantly negotiated with the regional councils.

Hidden budget
Technical costs are easily calculated, but they are not the only costs. The manager of the network has

only 2 hours of time liberated to attend to the machines and rest is done in his personal time.

The expert professor in charge of ICT, also a dedicated personal, works often during the weekends on school programmes.

In general, the teachers who participate in the project, give up a number of important hours and their personal time, which endangers their family life. This is why they demand a hidden budget and more manpower for ICT.

Time

This hidden time is not only an important element in the preparation of the of a quality teaching with ICT, teachers wish for :

- more hours liberated to organise cooperative collaborative work, the prepare ICT dossiers, make up course notes (this liberation of time therefore costs money) ,
- more half-groups or reliable manpower (this requires another group with a second teacher blocking, further the teacher s time)

Competencies

In order to maintain the project, it is necessary that computing competence is shared in the school. 12 teachers have been nominated from the start to posts with requiring computing needs and one teacher is liberated on a half-time basis to take care of the equipment in the computing area.

It is indispensable to ensure internal competence, but the 12 posts for general utilisation are centred amongst new arrivals, and their competencies are not sufficient for all aspects. These new teachers are not chosen in function of their computing skills. Teachers positions should be replaced according to their profile. A teacher in each discipline it should generate these innovations to the rest of his/her colleagues.

Furthermore, the competencies should be increased by teacher training (ICT evolves rapidly) and by basic training for those who wish to imply themselves further.

Teacher training

Teachers feel the need for computer training. Here they organise themselves into two levels at the start of the year, the beginners and the confirmed users, for teaming up into parts with expert teachers. However, two days hardly suffices, the students complain of lack of trained teachers even of the teacher in charge of the self-service learning centre.

In some cases, some students help teachers and these exchanges can be very positive. But the students needing information or training themselves need teachers competent in the field and are not accepting of late attention to their needs.

Besides pure ICT training the teachers feel the need of training adapted to utilisation of ICT, of pedagogical changes using ICT. This type of training is not provided.

Conditions of maintaining the ICT project

Student training

At the outset of the project, the students were trained for an hour a week, but the Rectorat put an end to the computing course. Only the students in the second grade have Internet training given by the CDI, those going into first or final grade don t have it as an obligation. The head of the CDI remarks that students are at ease with the mouse but less so with the keyboard, and some do not even know how to work Windows. Computer courses are always important due to the fact that not all students have home computers.

Of course, students who take the time (or who do not have the time to go to the self-service centre) can get training through the computer club. Nevertheless they have to use up their spare time, have the curiosity an perseverance. It appears that the hours of the self-service are problematic. *The hours of the self-service should be more flexible, if it is open when we are giving lessons, then it is of no use to us.*

To put back into place the student training, would be good for the continuation of the project, as it would facilitate more productive use of the software by the students and facilitate a realistic evaluation. *When some have finished typing 3 pages, others have not yet completed the first paragraph, this is problematic when trying to evaluate results* is the remark made by one teacher.

Teacher motivation

The motivation of teachers, one of the foundations of the project, necessitates taking into account their expectations. This is not however always sufficient, some teachers demand *respect of engagements towards them and compensation to the innovators* .

Motivation is hardest for those teachers approaching retirement, as they will soon leave and also for those that have not yet begun at all to become familiar with ICT. The use of new technology for teachers puts into question the role of the teacher and his/her knowledge.

In the light of this it is apparent that pedagogical training with ICT would be beneficial. It would permit responding to questions on the changes of roles and pedagogical format. It would reassure the anxieties of the teachers faced with this new situation and for some make the transition easier.

Teachers with leadership roles

The teachers who are leaders motivate the more hesitant teachers, they have lots of ideas and they speak out in meetings and in the corridors. They have the kind of energy that inspires multiple projects and are full of ideas. They never appear overwhelmed with their work and always in good humour.

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Faced with the vitality of the other the more hesitant teachers gradually become contaminated. At first, for small things like entering notes and then encouraged by these successes to find that it is not that difficult they engage themselves in page layout for their courses which permits them to become familiar with the software, before making up pedagogical materials.

All this requires time to penetrate for those that are hesitant, advice and training for the experts. Of

course, there are those that the experts are unable to convert at all and appear to not have the time .
When one questions teachers who use ICT, but still consider themselves as novices, the leaders and
their response are clear : if leaders should leave the school, everything would come to a halt.

The hypotheses

Hypothesis 1

Technology is firstly a forceful institutional level to obtain investment budgets notably regional
budgets which permit a quality framework of ICT in the school. For certain teachers, it is the occasion
to make the innovative pedagogical work visible, which otherwise would not become as known. For
the administration, it is a communication tool of manipulation, and not as yet used to its true potential.
For the students, this is an obligation, which for some the programme of office computing is built
into the programme, and in this case it works as a catalyst.

For others it is an activity which surpasses the habits between schoolwork and a hobby permitting an
enhancement of knowedge which is often acquired outside the school, on personal computers : a
hobby or passion is begun on the one hand by the technology. For others, it is a support which leads to
discovery of a new world, for which it would have been harder to reach without it, and in this you
could definitely say that the technology acts as a catalyst.

Hypothesis 2

The model of diffusion is of interest yet poses serious theoretical problems, which came to the
forefront by the analysis for this case (see, notably Pinch, Bijker, Law, Callon, Latour, Social Studies
of Science review) and which has been summarised in an article in 1989. That which diffuses
transforms in the course of the diffusion, so that it is of little relevance to believe that we can measure
equally/the same thing at given moments of the observation. Rogers himself proposes later a notion of
reinvention to treat this and it would be interesting to observe the work of this reinvention and make
the local comparison/translation necessary to make an appropriation.
On the other hand, one can view the framework of diffusion in identifying the leaders of opinion, the
gatekeepers. Some teachers were clearly identified from the start as hybrids, not only specialists in
certain discplines, but also devoted to ICT. These teachers remain not only the pioneers, but also the
indispensable adopters of the particular technical particularities of the school.

One also has to recognise that with Rogers there are partial adoptions concerning technology change :
some use is made of emails but little of the the web or that of CD-ROM. One cannot therefore refer to
ICT in general, if there is not an outside point of reference. When technologies began their diffusion,
they differed in way of use, games, e-mail, the Web and pedagogical applications have only one point
in common and that is that they are performed on computers (except not always for games) but
nothing stops one to pass to other. Students who are familiar with games that they do at home are

familiar with the technology in their manner, as that of the school it remains unattractive to others. However, one can deduce that with students who are leaders there are those that give advice to others, who lead workshops and these students inevitably also have home computers.

Hypothesis 3

The observation undertaken at this schools of diffusion reveals that the putting into place of networks and equipment does not have results in itself alone. The competence of the starter team who installed the network and its applications was certainly decisive and their motivation, their aptitude to escape from the framework and consecrate their personal time and effort is remarkable. The training teachers remains an essential lever and the weakness of the French National Education to undertake this in the high schools is a handicap. But in order for this training to begin on innovative practice, time must be taken and personal exploitation. This supposes a double passion for both pedagogy and that of technology, it is undoubtedly a minority that can partake in this form of teaching in the teaching sector as in all sectors. .

Nevertheless, the infrastructure will not be neglible : in the schools, the putting into place of the original network and the quality of a number of the machines made the innovative pedagogical proposition in technology more visible : this would not be the same if one just gave out a few computers to some isolated teachers in CDI. On the other hand, even a general infrastructure at the same level would not guarantee ICT use to develop throughout the whole school, and less and even less in an equivalent or standard fashion. It remains the dedication and competence of teachers that make the difference. It should be noted, however, that the obligation introduced for certain programmes for the inclusion of ICT also creates favourable conditions for its diffusion.

The hypotheses

Hypothesis 4

All witnesses agree that, more than the indicators which are difficult to interpret, that the impression that ICT is not a factor for increasing social and school inequalities. The ease of ICT use depends largely on home use. The purchase of machines is based on social differences as certain families have not got the means to invest in a family computer, however there are certain exceptions. Some students we observed, of assistant or helper status obtained this via their colleagues, with no correlation to their social of school level. One can even make the hypothesis thanks to the familiarity acquired in video games, where some defavorised students can gain confidence and become recognised in the school.

In terms of the level of school however, the general remark made by teachers that use technology in their courses is summarised as follows :   *with ICT the better students progress further and the weaker students do not progress* . This allows relativity on the question of ICT s effect The remark has more weight when at the same time the teachers who take the effort to innovate pedagogically in order to make their courses more attractive and active has the effect of being difficult by the students.

Hypothesis 5

These hypotheses are hardly apparent and difficult to document. It is certain that ICT requires time and can be considered unproductive, notably on the Web which is difficult to get going. However, the tutorials put in place are of quality, and made especially for teachers and integrated into the pedagogy. Concerning these products, one can consider that they improve the quality of teaching, but this is hard to measure as there is no measurement standard. One could say that despite the student results which have not suffered due to these innovations, if one compares them to the national standard. The creativity, curiosity and knowledge acquired in these areas are never measured and could not be considered as benefits until a restructuring of student aspirations is taken into account.

How do you spread a project of this nature to other schools ?

Introduction

The projet at the lycée d'échirolles appears very specific and therefore difficult to spread elsewhere. Nevertheless, it was thought at the outset to serve as a guinea pig. In fact the aim of the operation was to evaluate the impact of ICT and the success rate of the students to serve as kind of indicator.

In 1995, the Region took stock of the establishment in order to draw conclusions on the following:

- recognition of work and real impact ;
- impossibility to generalise due to the great investment, especially in terms of manpower.

A transposable experience

The experience of the lycée d'échirolles is transposable for the following reasons :

- This public high school is typically representative of the average national French high school, it is not an elite school , it is partly in a priority educational zone d'une Zone d Éducation Prioritaire et n'est pas trié sur le volet ? ?)
- The teachers are not experts in computing, the 12 special posts set aside at the outset are integrated in the 120 teaching posts who are all national teaching representatives ;
- The equipment intensifies elsewhere ; some classes like the STT need special equipment as ICT is part of their programme and their exercises are done on computers (they benefit from a special endowment) The academies push for the use of ICT for physics and languages. A link between these two branches of teaching is sought. Little by little the high schools are obtaining equipment which will permit them to develop ICT use in all sites.

An expensive experience

If some criteria lead to the belief that the experience of this school could spread to others without problem, it must be noted that this experience is considered as a very expensive one due to the global cost of the project.

It is of course possible to equip classrooms with multiple computers, to replicate the equipment of this experience , but this does not necessarily lead to a successful experience elsewhere.

For a project such as this one to spread successfully great human capacity is also needed :

- The profile teaching positions having computing experience and the maintenance in order to be able to surmount all the maintenance problems and give advice to the teachers,

)
- A small workforce to ensure the management of posts necessitates more teachers,
- Teaching hours for teachers to be liberated for preparation of courses using ICT and for updating and upkeep of their pedagogical tools,
- Teacher training (computing and pedagogic), training for students ...

All human means should be taken stock every as ICT equipment is a long term investment (a few years for changing of posts and software). It is the human investment that is the most costly.

Results

After ten years ICT has been introduced throughout the school, but what benefit does ICT actually serve ?

With the students the use of ICT depends on space. In the classroom, it is mostly the teacher that demonstrates, who in turn helps the students to use it. In the labs for TP, TD, ICT is available for manipulation. In CDI it is used for documentary research. Nevertheless,, the research activity and learning to learn need to recognised as a source of knowledge for tomorrow and that time needs to be invested (cf. including in transversal projects).

For the teachers, ICT serves to control absences, give advice to the classes, class work, document research, acquisition of pedagogical resources (documents, films, etc.) and exchanges (e-mail, but which is not generalised)

For administration of all habitual tasks.

Limitations

The most visible limit of the project is that a certain percentage of teachers (around 10%) remain reticent, but there is no real opposition. There exist also technical problems such as connectivity, printers out of action etc., but this is not different from elsewhere where new technology is used.

The most troubling limit is due to the gap between students who have computers at home and those that do not. They do not have time during courses to acquire ease of manipulation of the tools and do not always dare to go to the self service (or the hours are not convenient) or they already undertake other extra mural activities.

The costs and human investment for maintenance are under estimated , even in a high school which is well equipped, which leads to the breakdown of the network or peripherals (such as printers), this causes irritation for some teachers. The more teachers are engaged in ICT use, the more dependent they become, and need a reliable maintenance as these skills cannot stand up to their competence.

The current personnel is insufficient for these tasks.

Successes

The main success are :
- students are more autonomous;

- use of more active pedagogy ;
- increase of cooperation between teachers (meetings held to coordinate and harmonise work) ,
- Teachers train and self learn,
- an offers of important resources and a number of varied productions,
- improvement of administrative and routine tasks, etc.,
- A high use of Internet (8 hours per day) and the school network, quality personal output by the students (dossiers, web pages, multimedia), a high frequency during CDI of research, and the reputation of the school to the outside.
- The projects success can also be interpreted by the high baccalaureate success rate (more than 80%).

If it all came to a halt...

The unthinkable

When the question of suppression of ICT is posed, the teachers are perturbed and worried. Their responses are linked to personal use of ICT, therefore new habits acquired are put into question about moving one step backwards.

 there would not be a revolution but a stir (for most users),

- *the disciplinary fields would be perturbed, and there would be demotivation* (occasional users),
- *teachers would not be stoppable* (for the fans).
- One expert was very clear *I would resign* .

Improvements proposed beyond ICT

If a part of the ICT budget needed to be expended otherwise, all wish to see improvement in teaching and the quality of life in the school.

- Halve the number of students per class,
- Move closer towards the working world, more visits and stages,
- Have more linguistic tours and excursions,
- Purchase the CDI documents base,
- Expand the school, especially the canteen area,
- Rethink the security to enclose the school from the outside to avoid intrusion, drugs and racketeering.

Appendice A

Méthodes

Observations, entretiens et collecte de documents durant 3 jours, à 3 chercheurs.

Liste des interviews

Nom	Age	Sexe	Niveau de formation	Années dans l établissement	Discipline	Niveau informatique
Enseignants						
B.	47	M	bac + 4+CAPES	10 ans	physique	Bon
Me.		M	Bac +6 agreg	8	histoire	Bon
Mo.		F	Bac+4 +Capes	10 ans	anglais	Bon
Ti.	48	M	Bac +5 + Capes	10	SVT	Très bon
Ch.		F	Bac + 2 + Capet	6	Bureautique	Moyen
Chx		M	Bac+5 + agreg	10	Maths ?	Bon
Personnel général						
N.		M	Bac+5	6	Proviseur	Moyen
C.		M	Bac + 5 + Capes	4	Proviseur-adjoint	Bon
Je.		F	bac + 4+CAPES	10ans	Documentaliste	Bon
Ol.		M	Bac + 2 (DUT)	5	Technicien maintenance	Bon
Parents d élèves						
L.		M	Bac+5 MKT		Parent d élève FCPE	
B.	retraité	M	BEPC militaire		Parent d élève PEP	
V.		M	Bac +8 ingénieur		Parent d élève	
R.		M	Bac+ 5 ingénieur		Parent d élève PEP	

Continue page suivante

Appendice A, *Suite*

Liste des interviews *(suite)*

élèves	Sexe	âge	Classe	Ordinateur...
Ph.	F	20	Terminale STT	PC perso
Ba.	M	16	Seconde	PC perso
Ma.	M	19	Terminale ES	PC perso
Mac.	M	16	1ere ES	PC perso
Vi.	M	16	Seconde	PC perso
Du.	F	16	Seconde arts appliqués	PC perso
Dr.	F	17	1ere S	PC perso
Co.	M	18	Terminale Littéraire	Pas de PC

Appendice B Fiche descriptive

Coordonnées

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http://www.ac-grenoble.fr/

Téléphone : 33 (0) 4 76 33 70 00

Fax : 33 (0) 4 76 40 33 43

Proviseur : M. Nasra

Adresse électronique : lymcurie@ac.grenoble.fr

Description sommaire

Lycée public(de la seconde à Bac + 2) .

Baccalauréats littéraire, économique et social, scientifique, action communication commerciale, sciences et techniques du tertiaire, Arts Appliqués.

BTS Force de Vente

Ages : 15-20 ans en large majorité, 1350 élèves, 55%filles, 45% garçons, répartis en 44 classes différentes

Situation géographique : Périphérie de grande ville (Grenoble), accessible en bus et en tramway.

Profils des parents : pas d information précise recueillie, mais le lycée recrute à partir de 8 collèges dont 3 en Zone d Education Prioritaire, en général situées sur des   quartiers populaires , comportant des   familles défavorisées .