

The background features a dark blue grid with thin red lines. Two red rectangular boxes are positioned on the left and right sides of the central text area, each containing a white line drawing of a hand from Michelangelo's 'The Creation of Adam'.

INFORMATION AND COMMUNICATION
TECHNOLOGIES

IN SECONDARY EDUCATION

Ministère de l'Éducation Nationale
de la Formation Professionnelle et des Sports



Ministry of Education, Professional Training and Sports
Pedagogical and Technological Research and Innovation Co-ordination Section (SCRIPT)
Grand Duchy of Luxembourg, 2002
ISBN 2-87995-024-4

The presence of computers and the Internet in school is an indisputable fact. This is why, since the middle of the 1980's, education in Luxembourg has been taking into account changes in our society where information and communication technologies (ICT) have assumed a place of ever-increasing importance.

If, on the one hand, one should not fear the omnipresence of ICT, it is also true to say that it is neither a panacea for all our society's ills, nor the solution to all the problems of school and its pupils. A number of people believe that, over and above the potential benefits, there exists a real danger of man being enslaved by technology.

What is the role of the school in the face of these questions?

In the first place, we will need to continue to equip educational establishments, ensure that existing equipment is properly maintained and, at the same time, train pupils and teachers. Our main concern after that will be systematic research into the additional educational value to be drawn from the vast potential represented by the use of ICT in schools.

Computers are a powerful tool in education and learning and the Internet is a considerable source of information, provided it is used with discernment. This is why it is essential that particular care is taken with media education for our young people, so that they may understand the workings of these tools and the underlying implications of this new culture, and develop a critical mind in this subject.

This publication has two purposes - on the one hand, it describes the present state of the implementation of ICT in our post-primary establishments and, on the other hand, it sets out the strategy currently being pursued by the Ministry of Education, Professional Training and Sports with a view to the real integration of technological tools in education. I hope that it will thus contribute to a clearer picture of the challenges presented to us by the technologies of the future.

Anne Brasseur
Minister of Education,
Professional Training and Sports

ICT IN SECONDARY SCHOOLS

ACTIONS



Ministry initiatives
to promote the use
of ICT in secondary schools

Jos Bertemes
in collaboration with members of working parties
on the integration of ICT in the secondary curriculum



Axes of actions

You cannot force people to change, you have to create a context whereby they will change of their own free will

Christopher Bartlett, Harvard Business School

Case studies carried out in 2000 and 2001 on the success of the establishment of information and communication technology (ICT) in different secondary schools in Luxembourg revealed the principal constraints which have, until now, hindered the full integration of technological tools in education.

In the light of recommendations made in these reports, measures implemented by the Ministry of Education and Professional Training to promote the integration of ICT into the curriculum are divided along three axes:

- **the technical axis** whose principal purpose is to respond to the demands of users wanting reliable, available and easily-accessed material;
- **the organisational axis** which consists of proposing organisational models (timetable grid, materials to be used, management of teaching space, etc.) to promote the use of technological tools as learning tools;
- **the pedagogical axis**, the aim of which is to make available to teachers educational resources within the framework of a concept of integration of ICT, a concept developed in co-ordination with national commissions for programmes of secondary education.

In order to overcome increasingly important maintenance problems, the State Technology Centre (CTE) has created a structure whereby a group of technicians is responsible for the maintenance of IT hardware in post-primary schools. The size of this pool of technicians is expected to grow until a solution is reached whereby appropriate technical training can be provided in every school. Moreover, the pilot experiment "Electronic Schoolbag" will enable us to gather valuable information to determine those changes necessary to a school's internal organisation for the equipping of all its pupils with a laptop.

In response to the requests of users, both organisationally and pedagogically, the Pedagogical and Technological Research and Innovation Co-ordination Section (SCRIPT) has undertaken the co-ordination of a project for the integration of ICT in the secondary curriculum (projet elabotic.lu) and has, at the same time, made available human resources and financial means to ensure the completion of the project for the start of the school year 2002/2003. An analogous project within the framework of reform of the lower division of vocational education is being studied. The project elabotic.lu aims for a systematic and progressive integration of technological tools in all subjects. Working groups have developed integration concepts for technological tools in the different subjects, model units have been prepared and think tank members have provided ongoing training sessions.

e-Luxembourg projects will complete the plan of action established to accompany the change of direction in schools with regard to the use of the computer:

The “**Electronic Schoolbag**” project will enable us to measure the extent of efforts by the school community to provide each pupil and teacher with a laptop.

The “**e-ducere**” project aims to improve continuous training activities for teachers by, on the one hand, greater integration of ICT tools in communication strategy and, on the other, the creation of a national centre for pedagogical training and documentation (CNDFP).

The “**mySchool.lu**” project is expected to become the multilingual Internet portal of the whole Luxembourg school community to promote a culture of learning, communication and collaboration between all the partners of a school.

The following chapters will present in more detail the different actions undertaken by the Ministry of Education to encourage the growth of a culture of information and communication technology, and to guarantee equal access for all pupils to those tools which will be indispensable to them in their personal and professional lives.



Communication down the ages

So, what is the problem with school as we have moved into the 21st century? Society is changing with a rapidity that accelerates, but school has changed hardly at all. The gap between school and society increases. This in turn produces a sense among children all over the world that school is not seen as a bridge to the future, but as a bond to the past. I think that the disaffection and the problems with schools everywhere are because of this gap perceived by the children.

Seymour Papert, Meeting of the OECD Education Ministers – 02/04/2001

The advent of a society of information and communication brings about a revolution at the level of the exchange of information between people.

There was a time, before the invention of the written word, when information was circulated orally, simply by word of mouth to ear. Itinerant storytellers and village sages were the possessors of knowledge and passed it on in accordance with their own goodwill or with the rites and customs of the time. Only those individuals present at the time of speaking could receive the message.

The invention of writing allowed the lasting preservation of information and reference to it, even in the author's absence. It was, however, controlled at the outset by those in power and served their interests, to communicate between sovereigns, manage the state budget and control tax collection. This use of writing was then supplemented by scientific usage by accountants, doctors and philosophers who used it to set down not only their knowledge, but also the processes constituting this knowledge. The authors of these manuals would guarantee the accuracy of the contents and they were acknowledged for their wisdom and scientific authority.

Following the invention of the printing press by Gutenberg and, later, other mass media, the written press, radio and television allowed for the mass production of repositories of information, but the people at whom this information was aimed were, and still are, considered to be receivers. Their role was limited to the reception of messages, but it was difficult for them to respond to this one-way flow of information.

The technological revolution, and the advent of the Internet in particular, has produced a radical change, the receivers of information becoming the givers of information. People who were spectators have become actors with the help of new tools born out of technological evolution. The field of communication which was accessible to them, geographically and historically, has become enlarged.

The use of text messaging and Internet access means the user can send messages rapidly all over the world. However, communication is not just limited to text. Entire documents containing pictures, images, videos and sound can convey not only information, but also ideas and emotions. Thus, a vast and continuously evolving database is available to the user, who can derive great benefit from it as long as he uses it advisedly.

This is why, over and above the basic skills (reading, writing and arithmetic) which are the foundation of all learning, students of the new digital era will also have to learn to create and transmit their own work by appropriate means. Information and communication technology facilitates the creation of an environment conducive to pupils' autonomous work - it stimulates, feeds their curiosity and encourages greater involvement in their training projects, provided they have learnt to use these new tools appropriately.

Therefore, the integration of ICT in education is not a technological project, but belongs instead to the field of educational reform, being a much larger project with implications for all those involved in education (teaching staff, pupils, parents, school governing bodies, central administration, national commissions, unions, etc.). This also presupposes the acceptance of the fact that a change in attitudes and educational practices of all those involved is indispensable to see this reform through. In order to effect this change simultaneously (sine qua non of the systemic approach), it was essential to plan necessary accompanying measures such as the redefinition of objectives, the rewriting of the curriculum, the pedagogical accompaniment of change, the making available of resources and the documentation and evaluation of the progress of reform.



Why learn to use ICT in school?

School is not an island, and access to computers and the Internet at home and outside school can create new barriers and new problems of inequality, in the first place between those who have the necessary equipment and those who do not. It is important that schools and other public organisms strive to reduce to a minimum the gap between these two groups in such a way that the latter disappears almost entirely.

Lilla Voss, principal adviser to the Danish education minister

The socio-cultural and economic dimension

In this new society, often called “society of information” or “society of knowledge”, it is essential that all pupils acquire the skills required to respond to the demands of this permanently evolving society. In order to help these young people to find a place in the employment market later on, school must, from a young age, help familiarise them with technological tools to ensure equal access to available sources of information, in order to avoid a new social split, the numeric split between those who are computer-literate and those who are not. Faced with the growing computerisation of our society (emergence of new media, online services, e-banking), care will have to be taken to ensure that part of the population is not denied access to this new culture but, on the contrary, that each person's early training will enable him or her to participate in the public life of our country. Training young people in the use of computers and their tools, educating them in information access and handling, and teaching them to control and master these technologies will help prevent social inequalities from becoming ever deeper.

The governmental initiative “eLuxembourg” and the projects therein aim to involve all citizens in the information society.

The agreed objectives are:

- To initiate the young people of Luxembourg into the omnipresent digital framework in private, public and professional life;
- To train the young people of Luxembourg to use new communication technologies in an appropriate manner: to select information, to use and evaluate it, to share it with others;
- To prevent numeric splits by avoiding the gap arising between those who have mastered the tools of information technology and the “non-initiated”, thus preserving and promoting social cohesion.

Nowadays employers expect more complex qualities from their employees, particularly from those having completed a higher level of training. They are required to be proactive, responsible and creative.

In this newly emergent society positions of responsibility require people with a strong personality, a visionary mind, the ability to identify and solve problems and the willingness to work in a group and act as leader.

Preparing young people for the employment market is one of the educational aims of our school system. It is essential for school to respond to society's needs and to train men and women in the use of technologies in their specialised field.

Not everyone is able to develop in their professional life in the same way. New technologies must enable each person, regardless of social origin and educational background, to seize the opportunities which will allow them to improve their position in the world of work and in society.

The society of information in Luxembourg

Report by the Commission for Communication and Information – Chamber of Deputies – June 1996

The Ministry of Education, Professional Training and Sports intends to carry out a series of projects with the aim of promoting "e-learning" in the Grand Duchy of Luxembourg. The projects revolve around the following five axes and fall within the scope of progressiveness and evolution:

- to network teachers in all school establishments in a virtual community on the Internet, enabling the exchange of information and good professional practices;
- to equip a pilot school with laptops and integrate this working tool in educational methods and the learning processes of both teachers and pupils;
- to guarantee adequate information technology equipment in the different schools to ensure ICT integration in different teaching programmes;
- to establish an ongoing training policy capable of meeting training needs in the school system.



Why learn to use ICT in school?

In future learning must be active, constructive, creative and based on defined objectives. Information and communication technology can be used as a resource; pupils will learn by practice and by a process of discovery, and will progressively acquire the necessary skills throughout the learning process.

Investing in knowledge: the integration of technology in European education, ERT, Brussels, 1997

The pedagogical dimension

The aims of education may be defined according to three main themes

- the development of the person
- the building up of knowledge
- education in citizenship

School will, therefore, have to help pupils to become individuals capable of taking their place in society, critical and responsible citizens as well as independent learners, capable of researching, evaluating and organising information.

Learning is not simply a matter of accumulating knowledge (more or less shaped by a teacher), but of knowing how to put that knowledge into context and reuse it in different contexts. To this end school will be concerned with what the pupil learns, how it is learned and what use is made of this knowledge. Information and communication technologies are at the heart of these concerns.

New tools, born out of the digital revolution, offer possibilities of diversification in pupil training but, on the other hand, they necessitate new forms of organisation, new working methods and new relations between individuals.

All aspects of education are affected by the consequences of the contribution of information and communication technologies and, rather than constantly resisting "technology" and "pedagogy", it is time to stress the added educational value brought by the use of ICT in the complex process of learning.

The tools of information technology can only realise their true potential if the teacher establishes an appropriate educational environment conducive to the integration of ICT. As a result, the starting point of pedagogical thinking cannot be the tool of information technology; rather, questions will need to be asked first and foremost about the skills and objectives to be achieved as well as the methods of learning to be implemented. Care must be taken to manage the heterogeneity of the class, to vary the planned activities and to facilitate the working together of the class.

It is not possible to mention ICT without highlighting the possible negative effects of non-differentiated usage. It must be ensured that education with the help of ICT is not simply reduced to the simple transmission of utilitarian skills. Learning to create text documents is not an end in itself; formatting the document is necessary to convey the message.

Pupils may confuse information and knowledge - unlimited access to all kinds of information does not automatically mean that relevant knowledge is acquired. Information exists by itself, individually, whereas knowledge is organised in networks. Information may exist outside a context whereas knowledge always has a context. Constantly "surfing" on waves of information without ever "diving to the bottom" is an ever-present danger, made all the more real by the ease of manipulation of ICT tools.

Moreover, the apparent ease of use and the lightning speed of some tools can make users think it is no longer necessary to have a thorough mastery of basic knowledge - basics which will doubtless have to be redefined in the light of current developments. Indeed, the most powerful spell-checker does not obviate the need for learning spelling or principal rules of grammar, as its intervention is only of any use after the first phase of text creation. In the same way, the use of the calculator presupposes a mastery of the four basic operations as well as the decimal system.

The role of the educator is, therefore, more important than ever. He or she must ensure that pupils acquire the skills necessary for autonomous learning, then introduce activities suitable to enrich their learning, develop multiple skills and refine their learning methods – in short, to (re)discover the joy of learning and research.

It is time to stop setting traditional education and modern education with computers against each other! The latter will never suppress interest in a good lecture which sets down ideas. Just because we are saturated with chalk-and-talk, let's not go down the IT-with-everything road! Must we be reminded that too much time spent alone on computer learning results in fatigue, memory overload, inconsistent images, a superficial understanding dissuading deeper research, a dismantling of the hierarchy of information – in sum, a certain intellectual confusion? Computers are just another way of approaching knowledge; that's a great deal in itself.

*Monique Linard,
Machines and men. Learning with new education technologies.
(ed. L'Harmattan)*



www.elabotic.lu

Integration of ICT in the curriculum

It seems to me that those who are frightened by our technical progress confuse the end with the means. Anyone who struggles on in the hope of material goods alone will receive nothing worth living for. The machine is not an end: it is a tool. A tool like the plough.

Antoine de Saint-Exupéry, Land of Men

Preparing today's young people to deal with the rapid and permanent changes in our society is one of the challenges which must be faced by school. Pupils need to be given the foundations necessary for lifelong learning, new attitudes must be developed in favour of autonomous working, a spirit of initiative and a sense of responsibility whilst, at the same time, encouraging a critical mind in the student in the face of an abundance of information sources. The use of ICT plays, and will play, an important role in this.

An analysis of the old secondary education timetable shows that ICT is considered to be a separate subject and, therefore, used only a little, or not at all, as a tool for education and learning. The 2.5 lessons in years 9 and 10 created a new caste of educators – “the technologists” who became the main, if not the only, users of ICT in school. The integration of the ICT tool in education, as had been envisaged in all the initiatives in this field since 1986, had not therefore taken place, except in a punctilious manner or in some specific branches.

In the new timetable actual lessons in ICT in years 9 and 10 have been abandoned for a progressive integration in the different subjects, to take place over 4 years. Emphasis is placed not only on the mastery of purely technical skills, but also on the acquisition of multiple skills, namely

- processing of information
- data processing
- critical thinking with regard to media

Two rates of integration will be seen. In the lower division of secondary education one subject a year will be affected by the integration of ICT tools; in the upper division integration will be progressive across all subjects. A descriptive outline is attached.

Lower division of secondary education

Each pupil must be initiated into the use of ICT tools within the framework of well-defined educational usage. To build a foundation of savoir-faire which can be used throughout the curriculum (mastery of system use, text processing, tables etc.), a weekly lesson in years 7 and 8 will be split in two to guarantee each child access to a computer and the acquisition of the rudimentaries of computer usage.

Grade 7 : Initiation into information technology and word processing

Within the framework of the French lesson, a weekly lesson will be devoted to initiation into information technology, during which pupils will be familiarised with the handling of the computer, system use and word processing. Word processing brings an appreciable added value in terms of all writing activities, preparation, structuring, remodelling, reformatting and text embellishment. The non-definitive nature of electronic text means it is permanently capable of being perfected. Like modelling clay, it can at any time be restructured, enhanced or trimmed at will. There is much greater motivation for thinking about the text.

In phase one the pupil is initiated into the handling of the computer and its system use. Basic operations (switching on the machine, creating and manipulating files and directories, saving, renaming and deleting files, printing a file on the network etc.) are practised progressively.

A second phase is devoted to word processing with activities such as formatting, correction and restructuring of text and more elaborate examples of document creation.

Finally, it is envisaged, using short creative exercises, to embark upon collaborative writing activities, encompassing groups of pupils, or a whole class, indeed several classes. The activities suggested are examples of approaches which can be used, modified and adapted according to pupils' abilities and needs.

Grade 8 : Initiation into data processing

In grade 8 the teaching of German will be extended to a systematic initiation of pupils into data processing. The aim of this is to follow methodically a pupil's reference work. To start with, a fairly short text, a text extract, an account or a short story will be used as the media for the pupils who will initially study the use of reference materials in the library. Firstly, they will find unfamiliar words and phrases and/or explain some idiomatic usages. In order to accomplish this task, they will learn to consult reference works (on hard copy and CD-ROM), to distinguish vocabularies and encyclopaedias for example, and make appropriate use of them. They will then meet the CDI "librarian", who will allocate a group of reference works to each group. The pupils will use this information and, with the help of indices and summaries, will check that the contents do indeed correspond to the subject.

In the second term the use of reference materials will be extended to the Internet. The teacher will gradually introduce pupils to the key functions of the navigators, research and communication tools, and will instruct them in the correct and productive use of the services offered by the Internet - electronic mail, sources of reference and research, etc. The resources of this huge network will be exploited in order to benefit language teaching, equipping it to meet the greatest challenges of tomorrow's society.

In the third term a work of considerable length, for example a novel, will be the departure point for a more complex task combining research and the use of reference materials, in the library and on the Internet, which will enable pupils to use, value and evaluate knowledge acquired in the course of the school year.

Grade 9 : Mathematics and ICT

The teaching of mathematics will need to enable pupils to build up not only knowledge, but also a know-how transferable to situations likely to be encountered in their future lives. Rather than simply teaching methods in the manner of "cooking recipes", a pupil must be encouraged to approach a problem by motivating him to analyse the ins and outs of the situation, to explore different ways of solving it, to come up with forecasts and check them by using previously acquired mathematical understanding.

In geometry, for example, it is possible to present situations in which pupils will need to revisit acquired knowledge in order to discover new properties. This will make them aware that learning already gained will help with future learning, and they will understand the axiomatic construction of mathematics.

New technologies stimulate the development of skills such as the ability to explore unfamiliar situations, to reason and to solve problems. The majority of pupils show more of a natural interest in a learning activity which calls upon new technology, an interest which the teacher can then profitably use when placing, together with his pupils, the results of an experiment into an appropriate mathematical framework.

Geometrically constructed software such as Cabri-Géomètre will enable pupils to discover certain geometric properties for themselves through experimentation. For example, by moving a point whilst keeping it at an equal distance from two other points, the pupil will be able to discover the geometric properties of the median. The teacher will then be able to extract the correct mathematical definitions and possibly move on to a demonstration using the same software.

Upper division of secondary education (grade 10)

The teaching of ICT will give way to learning with the help of ICT, an integration which, in grade 10, will be given priority in the following areas: German, biology, French, geography and mathematics. In year 11 integration will gather momentum with the inclusion of subjects like English, natural sciences and economics.

German

In grade 10 the information processing begun in grade 8 will be extended to a more detailed and complex piece of research, in which the pupil's gradual working out and methodical approach to the task will be fine-tuned together. In this way the pupil will be enabled to carry out structured reference research resulting in an oral and/or written account and/or the creation of a reference file. Written accounts in the form of a presentation could be presented using PowerPoint.

As in grade 8, the pupil will be guided in his work by a number of work files which will tell him which step to follow - he will learn how to "navigate" like a well-informed internaut, to use functions allowing him to record, to collect and save information, to copy illustrations and text extracts and to co-ordinate an amount of data with the help of text processing in accordance with the requirements of the subject.

The pupil will also be better prepared to structure an oral or written account and to discover the discursive method. The pupil will learn how to extract quotations, giving the exact reference, and to attach a bibliography of written works used.

Should the case arise, the pupil will be in a position to use other electronically-supported databases, such as a dictionary on CD-ROM. He will be able to draw on the multiple resources of the multimedia arsenal in far greater measure. The final piece of work will be accompanied by a computer-generated presentation.

Biology

The main objectives in biology will be

- data processing
 - computer aided experimentation (EXAO): the use of interfaces (eg. CASSY-S or ORPHY) will improve pupils' understanding of biological phenomena through the experimental approach and familiarise them with modern experimentation and measuring techniques.
 - analysis, visualisation, interpretation and presentation of the results of experiments: classic office automation software will allow basic IT skills gained lower down to be put into practice and improved.
- information processing
 - searching on the Internet for supplementary information on subjects covered in lessons, on CD-ROM or other resources, will enrich and enhance the relevance of lessons.
 - pupils will learn to distinguish scientifically accurate and useful data (scientific reference sources) from unreliable data (tabloid press, etc.).

- They will be able to create a file of up-to-date information complementary to the lesson.
- viewing physiological and microbiological phenomena (CD-ROMs, web sites, simulations) will aid their understanding.
- autonomous learning and learning through problems.

French

In grade 10 a weekly lesson will concentrate on an introduction to media education. Different subjects covered in French lessons (social problems, violence, racism, environment, advertising, important events) will be tackled from a media viewpoint.

Pupils will find out about the different media, will learn to select media according to the information wanted, to rework and integrate information found, then to produce articles and illustrations themselves, on paper or computer.

Examples will be used as ideas for tackling subjects, integrating literature, the written press, radio, television, CD-ROM and Internet in an independent and critical manner. It will be possible to carry out the work in the classroom, the library, the CDI or the IT room, alternately or exclusively, according to the chosen approach and in keeping with the organisation and infrastructure of each establishment.

Geography

With openings as varied as the Internet and CD-ROMs, ICT tools can be used to interesting effect in geography. Their utilisation has the happy outcome of leading both educator and pupil to find their way, to reflect and to exchange views on their teaching and learning practices.

Their immediate use in geography will be visiting sites and understanding geographical phenomena through, amongst others, the intermediary of video sequences on CD-ROM or software simulating natural phenomena. In this way the teacher will have a supply of information and data, sifted beforehand by a group of specialists, which will be presented to pupils in order to get them to compare various current documents with scientific commentaries in school books.

The study of some areas of geography, such as demography or man's influence over his natural surroundings, will give the teacher an opportunity to set the pupils electronically edited projects, where more complex skills such as information research, data structuring and visualisation of results will be aimed for.

Mathematics

The utilisation of ICT will have to lead the pupil progressively to

- analyse the given facts of a problem and the relationship between them
- choose an appropriate method of work
- use the calculator and/or computer, questioning the accuracy of results found
- combine different methods of solving
- reproduce in correct mathematical language the process by which the solution is arrived at

In grade 10, the preferred tool will be the statistical analysis table and symbolic arithmetic software for the first steps in analysis.

The table will make it possible to explore and discover the structure of an expression in algebra, to understand the concept of the variable and to create, in a dynamic way, graphs and calculations on statistical data. The graphical calculator and/or formal arithmetic software will allow for more complex problems, bringing in parameters, and for open-ended problems, such as those of optimisation, to be tackled.



www.laml.lu

“Electronic Schoolbag” project

The idea of the “Electronic Schoolbag” project is to make a laptop available to every pupil at the Lycée Aline Mayrisch, which they will be able to use as a learning resource, both in various lessons and in the creation of any individual or group work they may carry out there. To this end, all classrooms and other learning areas in the school are being equipped for easy and rapid connection of the laptops to the local network and to the Internet. The aim is to give the pupils the opportunity to work with computers at any time, thus using the electronic schoolbag as a daily working tool which can be used easily whenever the learning situation arises.

Regular utilisation of laptops in different lessons and school disciplines is not competing with traditional forms of education. On the contrary, the integration of new information and communication technologies in daily school life constitutes a pedagogical approach that is certainly new, but complementary to educational methods already in place to reinforce, in a varied and modern way, the acquisition of skills aimed for in programmes of education. The priority of education will always be the search for added value.

The operation of the “Electronic Schoolbag” project comprises several phases - implementation of the tools in the establishment, teacher training, educational practice in the classroom and appraisal of the added educational value drawn from it. The technical equipping of the Lycée Aline Mayrisch site and the setting up of the laptops will take place progressively from now until 2004; 800 laptops will be operational from the start of the school year in September 2002. The electronic schoolbags are registered and each pupil has their own password.

In order to avoid any abuse of the laptops, the Lycée Aline Mayrisch has drawn up regulations defining methods of use and an agreement pertaining to this has to be signed by pupils, parents and the school. The laptops may only be used under the guidance of a teacher. The installation of Internet access control systems blocks access to web sites unsuitable for pupils. Internet access is moreover limited to those pupils with a certificate in elementary IT applications. All the machines are equipped with an anti-theft system.

An ongoing training programme is open to teachers wishing to acquire the necessary knowledge for the integration of laptop use in their respective subjects. Owing to the high specificity of the “Electronic Schoolbag” project, close collaboration between teaching staff and outside IT experts is essential to co-ordinate different experiences, and to work out solutions for possible problems with these new practices. A hotline is available to teachers as well as pupils; it can be contacted at any time for queries relating to the handling of laptops and also deals with technical problems.



www.myschool.lu

"Education Portal" project

mySchool.lu is the education reference portal for the Ministry of Education, Professional Training and Sports.

In its capacity as a portal, mySchool.lu establishes a multilingual platform for the whole school community of the Grand Duchy of Luxembourg for a culture of learning, knowledge, communication and collaboration directed towards the future.

Grounded in the latest information and communication technologies, mySchool.lu offers all its identified members (pupils, educators, administrators), but also pupils' parents, a single entry point for the effective management of all educational and administrative duties.

- in the medium term mySchool.lu offers teachers and pupils identified and completely free access to quality applications and information relevant to their interests and their level of knowledge (lessons, dictionaries, encyclopaedias, Internet sites, online training, electronic schoolbags, official documents and publications, statistics, graphs, etc.).
- mySchool.lu offers a friendly working environment, assembling tools of research, communication and effective collaboration.
- mySchool.lu offers highly secure access, accessible from anywhere, available 24 hours a day.
- mySchool.lu guides its members, by means of their user profile, to quality information and knowledge.
- mySchool.lu allows the targeted spread of information, knowledge and applications to those involved in the field of national education.
- mySchool.lu allows every user registered in the portal to choose his navigational language and to personalise the look and feel of his working environment.

An interdisciplinary team of teachers is in place to fulfil the role of content maintainers for the pedagogical aspect of the mySchool.lu portal. These experts will be responsible for the identification and referencing of the educational contents of the portal. They identify and point out significant collaborative activities (education networks abroad, publishing houses etc.), which could enlarge the knowledge section of the mySchool.lu portal according to the needs of the different target groups. They submit proposals regarding the implementation of new gadgets and the integration of new applications, and are prime movers in the virtual community relating to their branch. As all the contents listed in the portal must be subject to strict quality control, their work will be done in close collaboration with the national commissions for the respective programmes.



www.script.lu

"e-ducere" project

In accordance with the government programme, in-service teacher training is to be seen as a priority, requiring significant development. Moreover, this decision coincides with greater demand coming from both secondary school leaderships and teaching staff. Factors conducive to the professional development of teaching personnel are thus combined - political will on the part of the Government and demand from the people concerned.

To meet these needs and expectations, and acting within the framework of the tasks assigned to it by law, S.C.R.I.P.T. has initiated the development of continuous training activities whilst placing the accent on the integration of information and communication technologies in teaching and learning.

In the preparation phase two priority aspects have been identified:

Reorganisation of continuous training

- *Online management:*
improvement of access to information and management of registrations (accessibility);
- *Offers:*
creation of distance training activities, alternating with social forms of training (diversity of training);
- *Guarantee of quality:*
drawing up of a system of evaluation (efficiency).

Rethink of continuous training

- *Conception*
Continuous training, an ongoing process of personal and professional development, must be conceived by taking into account personal development ('individual' focus) and the development of the school ('community' focus). According to Huberman (1989), teachers see themselves differently at different times in their career, and these perceptions influence their work in class and, more generally, their professional commitment. As a result, the provision of differentiated ongoing training should support teaching staff throughout the whole cycle of their professional life.

- *Strategy*
In response to the need for educational engineering, the following targets were set, among others, at the conference 'Information technology in school: reasons and strategies for investment', organised in July 1999 by the Council of Europe: to network together, to be able to evaluate the educational impact of products, to speed up access to sites and to have reliable directions to the information needed, to create an exchange of experiences, to create scripts, scenarios and a structure facilitating the production of personalised educational materials, to create lesson plans and to develop the means of participating in discussion and production groups.

➤ *Contents*

ICT training needs to be strengthened at three levels, namely:

A) Basic skills in personal control of ICT related tools

- Elementary knowledge of handling different IT and audio-visual equipment.
- Elementary knowledge of current office automation software.
- Ability to produce a document comprising of text, tables and pictures.
- Ability to carry out research on communication networks, notably the Internet
- Critical analysis of documents found on the Web

B) Skills related to educational practice

- To be able to identify teaching and learning situations in which ICT is an effective aid in the building up of knowledge.
- To be able to establish educational environments conducive to the participation of all pupils.
- To be familiar with the use of ICT as a resource, both collectively and in exchanges, and to be able to integrate it in the teacher's practice.
- To be familiar with and use subject-specific opportunities offered by ICT: to exchange pedagogical experiences, to share educational resources, to develop working strategies in groups, to attend (and/or set up) teacher networks and distance training.

C) Evolved skills

- To understand the cultural, social, legal and economic implications of ICT.
- To appreciate the complexity of the learning process due to the diversity and number of potential sources of information.
- To be aware of his/her role as mentor for the citizens of the future: the pupil will need to be taught the skills necessary to analyse information gathered in a critical manner, to be vigilant regarding the security and reliability of information sent and received, and to act with respect for the law (individual liberty, protection of intellectual property, personal responsibility).



Bibliography

- Inaugural speech of Prof. Dr. Takashi Sakamoto, Director of the National Institute of Multimedia Education Japan.
- Pascale Petry, *Documentation du projet e-ducere*, July 2001
- Josiane Basque, *Compte-rendu de l'initiative "L'école informatisée clés en main"*, Société GRICS
- Carr-Chellmann, A.A. (1996), *Distinguishing systemic from systematic*, Tech Trends, 41(1)
- Anne Turnbaugh Lockwood, *Technology and Educational Transformation*, NCREL (North Central Regional Educational Laboratory)
- Report of the General Inspection of the Ministry of Education, France, <http://www.educnet.education.fr/actu/igen.htm>
- Documents of the National Commission for ICT Programmes
- Guy POUZAR, *Pourquoi l'école changera!* Revue de l'EPI No 87 Sept. 1997
- P. Ertmer and T. Newby, *Behaviourism, Cognitivism, constructivism: Comparing critical features*, Performance Improvement Quarterly 1993
- R. Barr and J. Tagg, *From Teaching to learning*, Change, 1995
- E. Thoman, *Skills and Strategies for Media Education* <http://www.medialit.org/ReadingRoom/keyarticles/skilsandstrat.htm>
- Dan Sperber, Institut Jean Nicod, (EHESS/CNRS) *Cognition, mémoire, culture*. 1997, EDF web site
- Réginald Grégoire, Robert Bracewell, Thérèse Laferrière (TeleLearning Network Inc.) *Intégration pédagogique des technologies de l'information et de la communication*: http://www.fse.ulaval.ca/fac/tact/fr/html/apport_court.html

Integration of information and communication technologies
Objectives and organisation for the school year 2002/2003

Grade	Subject	Overarching Skills – Learning	Organisation
7	French	To master the use of the system To write	<p>During one weekly lesson of the six allocated to the teaching of French the class is split into two groups under two teachers, the French teacher and a second teacher who takes this class for another lesson. During the first term one group will be taken by the French teacher; the second teacher will undertake IT teaching with the second group. Having swapped groups during the second term, the two teachers will spend the third term preparing and carrying out a joint project using ICT as a resource for creating a piece of work (individual, group, whole class) with French as the common language.</p> <p>To ensure a balance between grammar teaching and reading, it is no longer possible to allocate two different teachers to the teaching of French in the same grade 7 class.</p>
8	German Biology Geography History	To retrieve information To process information To research information	<p>During one weekly lesson of the four allocated to the teaching of German the class is split into two groups under two teachers, the German teacher and a second teacher, either of biology, geography or history. The two groups will alternate each week.</p> <p>The German teacher will do a systematic introduction to data processing (library/media library, Internet); the other teacher will use this extra lesson to put these methods into practice within his or her own lesson. Pupils need to be shown information highways complementary to schoolbooks, how to handle and verify the information found and evaluate it.</p>
9	Mathematics	To simulate a process To experiment	<p>The use of ICT will be integrated in the teaching of mathematics where the pupil is expected to approach a problem by motivating him or her to analyse the ins and outs of the situation, to explore different ways of solving it, to make forecasts and to verify them by using previously acquired mathematical understanding. The tool Cabri Géomètre in particular will be utilised within geometry teaching.</p> <p>The number of weekly lessons will be taken to 4, preferably with 2 consecutive lessons to help the teacher manage the integration of the IT tool.</p> <p>To compensate for the efforts in integration agreed to in years 7 and 8, the number of hours of German and French will be increased by 0.5 hours per week.</p>
10	German	To research information To analyse/organise information To write	<p>The teaching of ICT will give way to learning with the aid of ICT, an integration which, in year 10, will be given priority in the following areas: German, biology, French, geography and mathematics.</p> <p>To help the teacher manage the IT tool more effectively, the provision of a continuous block of 2 consecutive lessons for the teaching of German, French and mathematics is strongly advised.</p> <p>The teacher decides on the proportion of use of the IT tool within his teaching, whilst keeping to a minimum use of 0.5 hours per week annually. An exception is made in the case of French teaching, where the equivalent of a weekly lesson is to be devoted to an introduction to, and education in, the media.</p>
	French	Media education	
	Mathematics	To simulate a process To demonstrate To process data	
	Geography Biology	To experiment To conclude To process data	

Annex 2

Provision of home computers for post-primary pupils

Whilst there are exact statistical data regarding IT equipment in schools, data on pupils' personal IT provision have up until now not been available. However, if the computer is to be considered henceforward as a tool for education and learning, it is important to know to what degree this tool is also available to pupils outside school. A study carried out in April-May 2002 with 22,848 pupils in post-primary education helped determine not only the number of home computers, but also to gain information about peripherals, software and Internet connection. It is important to note that this study is to be seen as a quantitative study, but qualitative information can be extracted from the replies given in the framework of the PISA study.

The entire study is available in electronic form on the SCRIPT website at http://www.script.lu/documentation/publication_tic.phtml.

The table below summarises the main findings of this survey:

SE	97% 80%	97% of pupils in secondary education (SE) have access to a home computer, and 80% have Internet access. It is noted that parents of SE pupils have anticipated a possible requirement from school to have IT equipment. Strategies will need to be developed to create learning situations where the pupil can use home computer equipment.
TSE	88% 60% 19% 50%	In vocational education (TSE) it is found that pupils are disadvantaged in relation to SE pupils, as much with regard to computer (88%) and Internet (60%) access as to levels of peripheral and software equipment. An alarming fact is the large number (19%) of computers without a printer. One might be tempted to think that the IT tool is considered not so much a tool of learning as of entertainment. Moreover, half of TSE pupils with a computer are the only ones using it, which would suggest that the majority of them have nobody at home to guide and advise them in the use of the IT tool. (On the other hand, it must be noted that in SE more than 60% of pupils share the computer with a member of their family).
Girls vs. Boys	-10%	In the area of computer access, as well as in that of peripheral equipment, it is noted that girls are disadvantaged in relation to boys. This specificity must be taken into account in the development of pedagogical activities.
Complementary education	40%	40% of pupils in complementary education have no access to a computer. Here school is called upon to make good a social deficit (taking into account the social background of the majority of pupils). In the face of systematic computerisation of our society (banks, administrations, etc.) it must be ensured that these pupils are not cut off from access to a new culture, thereby taking a section of our future working population out of the picture.

This publication on information and communication technologies (ICT) in secondary education aims

- to present a brief historic overview on the introduction of computers in post-primary schools,
- to draw up, in an international study, a detailed inventory of the current situation,
- to propose a range of recommendations to carry out full integration of the technological tool in education,
- to present the ideas behind actions undertaken from the beginning of the school year 2002/2003,
- to suggest a number of educational possibilities in the field of ICT,
- to record the e-Luxembourg initiatives of the Ministry of Education.