



Comparative Study: School Networks in Latin America

Julián DUNAYEVICH <julian@esc.edu.ar>

Jorge MAYER <jorge@esc.edu.ar>

Romina D'ERAMO <romina@esc.edu.ar>

Red de Escuelas

Argentina

Arnoldo VIDAL M. <avidal@iie.ufro.cl>

Enlaces

Chile

Víctor GUERRA <vguerra@servidor.unam.mx>

Red Escolar

Mexico

Alejandro PISANTY <apisan@servidor.unam.mx>

Universidad Nacional Autónoma de México

Mexico

Abstract

Several Latin American and Caribbean countries have made progress in designing and implementing school network projects at a national level. These projects have been undertaken as part of an educational system modernization process. These ongoing projects are related to new trends in communications and information technology in the field of education.

This paper will analyze the various national experiences. Its main points are the following:

- Different types and approaches of the several national projects; definition and scope of universe and of basic strategies; goals; adaptation modes between the project and the type of educational system; network extension programs; and interpreting these policies in terms of making up for inequality.
- Network engineering models; existence or lack of a central backbone; types of telecommunication technologies; supplying equipment; scope of service; and accessibility to rural zones and those difficult to access.
- Program administration policies; financing; participation of private sector; agencies for project management; management, technical, professional, and educational teams; budget makeup and administration; and studies on the regulatory framework of each country.
- Pedagogic models; teacher training; developing educational programs; educational TV experiences and multimedia resources; and adapting such resources to classroom and school.
- Development of national experiences; degree of implementation; evaluation systems used in carrying out and achieving goals; and indicators of the impact of the policies on the educational process and on the region.

Project reports as well as statistical and technical reports will be used for this paper.

Contents

- [Information and communication technologies in public education policy design](#)

Information and communication technologies in educational programs in Latin America

- Enlaces (Chile) <http://www.enlaces.cl/>
- Red Escolar (México) <http://redescolar.ilce.edu.mx/>
- Proinfo (Brazil) <http://www.proinfo.gov.br/>
- RedEs (Argentina) <http://www.esc.edu.ar/>
- Services included in the projects
 - Chile
 - Brazil
 - Argentina
- How is a school network financed?
 - Chile
 - Mexico
 - Brazil
 - Argentina
- Conclusions
 - ICTs implementation generated curricular changes
 - ICTs as the driver of teachers' continuous improvement and academic exchange
 - Networks will be a tool to achieve more homogeneous education plans and offer the same opportunities of study and access to information
 - Networks will make it easier to establish regional educational policies
 - Network content: an issue still to be defined
- References

Information and communication technologies in public education policy design

Over the past years there has been a growing trend toward modernizing educational systems. There are various new models for using technological resources in education, known as *information and communication technologies* (ICTs). ICTs can be found in a large number of different fields of human activity and they have a growing capacity for storing, processing, producing, and transmitting information.

Information generated by the ICTs requires that the educational systems use new knowledge resources and the values that current circumstances require. Thus, criteria may be generated with the purpose of selecting and evaluating such information in terms of effectiveness and relevance, and in addition new ways for bringing about knowledge may be learned.

Within this context one of the main challenges is to carry out the technology use process, while at the same time providing increasing knowledge about, and control over, these technologies.

It is widely known that ICTs allow access to a wealth of information, in addition to offering increasingly sophisticated possibilities for the production of education-related syllabuses and contents. Therefore, investing in the development of these technologies yields results difficult to match by other means. ICTs offer new possibilities to reach distant places or those difficult to access. In addition, these are tools that tend to diminish inequalities stemming from different opportunities to access education, culture, health, and entertainment and thus are extremely valuable.

The following remarks are needed to clarify our starting point. As seen from a macro social level analysis perspective, the expansion processes of these technological resources tend to bring about significant changes in the social structure of most societies. Even though these changes vary in different countries, they have caused a widening gap in social classes, at least in the 80s when new production organization modes generated significant productivity growth for a specific business segment -- that of the most up-to-date companies, in terms of new technology use [\[GIDD1983\]](#).

The widening gap came about due to a technology revolution that generated high unemployment rates and a restructuring of the higher productivity sectors within the global economy. Education plans to be implemented should

therefore focus on this issue, granting access to education in the use of technology resources. The overall results of this balancing policy should be assessed from a global perspective and in the long term [DHAR1989]. Nowadays the most outstanding political scientists question the fact that the liberal democracies show an unexpected capacity for generating large inequalities within the framework of stable political regimes [HOBBI1988].

Thus, the use of ICTs is part of a process and its success is contingent both on how it is implemented and on other goals and values of a social nature that may be desired.

The application of new technologies to education is being carried out in a large number of countries, even in the less developed and very poor ones. The association between ICTs and education is currently well known in different forms: pilot projects, isolated private projects, government policies, and development or educational projects of international organizations.

The aim of this article is to make a comparative analysis of experiences in implementing nationwide school networks in different countries. This may lead to general issues involved in public policy implementation or, if more limited, to issues related to education. We will focus on Argentina, Brazil, Chile, and Mexico.

Differentiating factors in the various projects are of a very elementary nature: number of inhabitants, number of students, geographic distances and social gaps, development center distribution, and access to energy and to basic communication resources.

From an international perspective, we can see numerous ways in which governments involve the private sector in project generation. While in many Latin American countries, it merely acts as a service contractor, in other countries, such as the United Kingdom, the government requires companies to participate in certain ways in exchange for authorizing their participation as providers of new services. It should be pointed out that the more industrialized countries appear to be much stricter in terms and conditions for those private enterprises that wish to participate in these types of policies than the less developed ones. This may point to a trend toward a reversal in the integration mode of the private sector in the context of such policies.

The question that we deem to be key to this article might be the following: Are there common standards for the formulation of projects worldwide, in particular in Latin American and the Caribbean? If so, do these standards seem to meet requirements or principles that appear to be universal?

Information and communication technologies in educational programs in Latin America

The Chilean, Mexican, Brazilian, and Argentine Ministries of Education deemed it necessary to create a system that would enable them to unify and link their countries' educational institutions.

Therefore, they set up systems to meet their needs and development possibilities, but the four countries took into account that it was essential to bring the ICTs to their teachers and students.

Enlaces (Chile) <http://www.enlaces.cl/>

The Chilean [Ministerio de Educacion](#) (Ministry of Education) through their [Programa de la Calidad y Equidad de la Educación \(MECE\)](#) (Program for Education Quality and Fairness) seeks to introduce improvements and innovations in teaching so as to improve the quality and fairness of the Chilean educational system.

It is the purpose of the Chilean Educational Program *Enlaces*, ongoing since 1993, to make the technology available to financially aided schools, whether municipal or private, primary or secondary.

Chile plans to have a nationwide network, which is able to grow, but is decentralized. Within this context teachers are perceived as key agents for change together with the technical and training support structure entrusted to universities

and higher education institutions.

Enlaces believes the improvement of education quality by using information technology in schools depends on the attitude and on the work of teachers. Hence, teachers who join the project (20 per school) are trained for two years and are given technical support. Free Internet and a variety of educational software is also available to them. They become familiar with the programs so as to be able to apply them to the teaching-learning process.

Enlaces plans to reach 100% of high schools and 50% of elementary schools by the year 2000, which is to say approximately 5,000 subsidized schools. Currently 3,000 elementary schools and high schools have joined the net, thus making up a large virtual community benefiting over 1,400,000 students and over 35,000 teachers. Of the municipal and private schools 95% are subsidized, with the remaining 5% made up of private schools that pay and are in the net with their own resources.

The government is in charge of providing equipment and assisting schools in *Enlaces* both technically and pedagogically, as well as connecting them to Internet services. Private institutions are given the software and necessary documentation and each one joins the net with their own resources.

The target of *Enlaces* for the next two years is to allow net primary and secondary schools to form a nationwide school community able to interact regardless of their physical location or sociocultural characteristics.

This net not only supplies the means to include ICTs in the education process but is committed to controlling its use as well. From time to time they evaluate the impact of ICTs on education by means of tests and surveys given to students and teachers. They also supervise technology use, teaching experiences, and administrative use of the tools.

Red Escolar (México) <http://redescolar.ilce.edu.mx/>

Red Escolar (School Network) is the name given by the [Secretaría de Educación Pública](#) de México (Mexican Public Education Secretary) to a project planning to introduce ICTs to education.

This project, which started as a distance learning plan for adults, brings the Internet to every education level classroom with the purpose of making available to students information on different subjects, giving them a different research source and the possibility of expressing themselves.

Through *Red Escolar* the government provides computers with resources to access the Internet, as well as a variety of school educational software to public elementary schools and teacher training high schools, thus serving their needs.

Red Escolar as well as Chile's *Enlaces* aims to decentralize the curricular and administrative network aspects. It furthers the developments of government programs of computer education and is enriched by similar projects created by federal organizations.

The Secretaría de Educación Pública de México (Mexican Public Education Secretary) set guidelines to be followed by the net. The Secretary also encouraged *Red Escolar* to promote reading and writing skills and math, as well as an interest in research and in team work, to facilitate access to information sources, and to consult directly with specialists, using e-mail and discussion forums.

Red Escolar is aware that teachers may feel confused when confronted with the ICTs and therefore they are offered opportunities for training and professional updating. In general, the net promotes techno-pedagogic teams in each school.

This net offers a teacher training program for a minimum of 10,000 teachers (two per school) and a technical support and maintenance program for schools.

The *Red Escolar* program expects to provide a Media Classroom with five to ten computers each for 3,000 elementary schools, and 2,000 high schools. In addition they will supply peripherals, special software and CD-ROMs, a TV set, and a VCR.

Red Escolar began its work in 1996. During the first stage, approximately 400 schools, which already had computers, joined. In 1998 the net was made up of 400 primary schools, 600 high schools, and 32 teacher centers, as well as teacher training schools. They estimate that by late 1999 there will be almost 2,000 schools, half of which will be equipped with their own resources while the rest will receive contributions from several organizations.

Proinfo (Brazil) <http://www.proinfo.gov.br/>

The [Secretaria de Educação a Distância](#) del [Ministério da Educação](#) (Ministry of Education's Secretary for Distance Learning) is in charge of implementing the *Programa Nacional de Informática na Educação (Proinfo)* (Educational Computing National Program). The Brazilian government is planning to introduce ICTs to diminish education opportunity differences among students of public and private schools.

Teachers are trained to know how to apply the technologies to daily tasks, given the fact that studies performed show that 20% of the teachers are skilled and use ICTs, while 20% are unskilled and resistant to using them. The remaining 60% are unaware of what to use them for.

Brazil decided to implement this program in a decentralized manner, so that each state would be able to adapt it to its own characteristics. However, national authorities are pedagogically responsible for *Proinfo* and are in charge of school equipment for a five-year period. The government approves projects for each state.

In 1998 *Proinfo* reached close to 6,000 schools (about 8 million students), 13.4% out of a 44,800 public school universe made up of primary and secondary schools, each one attended by over 150 students. *Proinfo* estimates the minimum hour/student ratio needed and evaluates resources and equipment in relation to fulfill this. This is an uncommon characteristic among the projects reviewed.

RedEs (Argentina) <http://www.esc.edu.ar/>

The *RedEs* project is implemented by the [Ministerio de Cultura y Educación](#) (MCyE) (Ministry of Culture and Education) with the purpose of improving communication and exchange of information between schools and libraries, as well as national, provincial, and municipal education authorities.

Red de Escuelas will be built on a public utility structure. It will use existing connections of the telecommunication companies and of the Internet providers; but it is also institutional, as the Ministry of Education's Technical Council, representing all its agencies and programs in agreement with provincial ministries, will determine priorities regarding uses, conditions, and applications.

In five years *RedEs* will have linked all Argentine schools (44,000). Given the size of the project, the first short-term target in late 1999 will be to link schools that are currently part of Ministry of Culture and Education programs, starting with high schools, rural schools, and the last three elementary school grades. An estimated number of 3,000 schools will have joined *RedEs* in the course of this period.

The Ministry of Culture and Education through *RedEs* plans to invest in communication infrastructure, in maintenance, technical support, and dissemination. *RedEs* will use computers already made available by other programs and projects of the Ministry of Culture and Education, and others to be made available.

RedEs will be built on the basis of existing programs, such as the following, to which its activities will be linked:

- *Red del [Plan Social Educativo](#)* (Social Education Plan Network), a project that gives access to the Internet to those benefiting from the Plan de Becas (Scholarship Plan).
- *[Red Telar](#)* (*Todos en la Red*) (Everyone in the Net), a project that, based in the Red de Escuelas, provides schools with pedagogical content and promotes learning projects carried out by teachers and students.
- *[Red Electrónica Federal de Formación Docente Continua](#)* (*REFFDC*; Federal Electronic Network for Continuing Teacher Training) provides distance training to teachers in every school in Argentina.

- [***Biblioteca Nacional de Maestros***](#) (Teachers' National Library), is an organization that plans to coordinate and manage a consortium of educational information jointly with Centro Nacional de Información Educativa (National Center of Educational Information). The consortium members are documentation centers, pedagogic libraries, community libraries, and multimedia resource centers at schools.
- [***Proyecto de Descentralización y Mejoramiento de la Educación Secundaria***](#) (*PRODYMES*; Project for Decentralizing and Enhancement of Secondary Education), a project that subsidizes 630 secondary schools implementing the education reform with over 250 students and a high quantity of failing students. *PRODYMES* subsidizes computers, infrastructure, and other goods for these schools.
- [***Red Federal de Información Educativa***](#) (*REDFIED*; Federal Educational Information Network). The purpose of this organization is to supply reliable statistics to be used to plan, monitor, and evaluate the educational systems as well as changes in it.

Services included in the projects

Chile

Enlaces is linked by e-mail and education bulletin boards. It uses a technical support and training system made up of high prestige universities. This system, known as [***Red de Asistencia Técnica de Enlaces***](#) (*RATE*) (*Enlaces*' Technical Support Network), provides connectivity and techno-pedagogic support to projects participating in the project. The universities are divided into six Zone Centers (four geographic zones: North, Center, South, and Austral South) and 21 Executive Units.

Enlaces provides the following to public or private subsidized schools: a computer room equipped according to number of students, connectivity, software, and two years of technical support. To ensure optimal use, computer specs are updated every year.

Brazil

Proinfo uses microcomputers, MS-Windows IBM compatible PCs (as used in every government office in Brazil), and a variety of software programs needed for school work, such as word processors, spreadsheets, data bases, and others. Color printers, graphic interfaces, and the hardware and software needed to provide access to the Internet and [***TV-Escola***](#) (the Brazilian TV education system) are included.

Argentina

RedEs plans to test various school-linking technologies during its first year. The fact that new low-cost data transmission services, as well as services unavailable at present due to the regulatory framework may become available, will be taken into account.

Agreements with the telecommunication companies were signed so as to connect the schools. This was done with the purpose of reaching schools more easily, without the need to carry out an initial investment in data network development. Schools will be provided with a telephone line and two daily hours of free phone service to access the Internet. Registration and data network use will be free.

RedEs topology will consist of high-capacity servers supplying: management of network names for schools, receiving and storing e-mails, sending e-mails, chatting, and discussion forums, among other services.

As new developments in the Information and Communication Technologies are very frequent, *RedEs* assigns part of its resources to research in the new technologies and to the possibilities of using them. They also focus on the relationship with telecommunication companies so as to learn of possibilities of implementing new technologies.

How is a school network financed?

Chile

Chile's Ministry of Education considers that the private sector will be an essential factor for the *Enlaces* project to meet the goals set for the end of 1999, demanding an estimated investment of US\$120 million.

The most expensive component in *Enlaces* is hardware (close to 70% of the budget), the service life of which is about five to seven years. This means that many schools will need to upgrade and add to their computing rooms beginning in 2000.

On the other hand, both elementary and secondary schools will have to somehow gradually undertake the expense of their connection to the Internet with increasing bandwidth and accessibility demands. This will involve more telephone lines, higher speeds, improved modems, high-capacity servers, and ultimately, higher costs for educational institutions. This reality and the way it is addressed should be the core of strategy to attract private sector support and participation.

Depending on the laboratory's dimensions, the costs in Chile amount to US\$5,773 for a small lab fitted with three PCs and one printer at schools with less than 100 students. US\$9,003 is needed to install six computers and two printers where 100 to 300 children can be instructed, and a large laboratory with nine computers and two printers for over 300 students demands about US\$11,980.

Mexico

In a volunteer and shared effort, all community sectors in Mexico -- teachers, students, parents, and education authorities -- are summoned to support *Red Escolar* development and maintenance through financial contributions; human resource allocation; and equipment, service, promotion, and training provision and upgrading.

The project expects financing to come through a three-legged participation scheme where the federal government, the provinces, and society will add their contribution. One of the most fundamental bases for the network are universities and other higher education institutions, which provide training, undertake the education of academic leaders, and integrate their students to the social service projects promoted by the network. In any case, IADB and the World Bank have granted the government loans intended to fund the project's progress.

Estimates for this endeavor have set the demands for a general scheme with minimum infrastructure consisting of one TV set, a VCR, and 5 to 10 PCs at US\$17,000. Seventy percent of this investment is supposed to come from the federal government, 20% from the province or municipality, and the school would fund the remaining 10%. The school will also bear the costs of the telephone connection, the space, and furniture of the place where the laboratory will be located.

Brazil

The people in Brazil think that *Proinfo* effectiveness and continuation will depend on the availability of financial resources. The investment for 1997-1998 was estimated at about US\$300 million for training, technical support, purchase of equipment, remodeling of facilities, school networking, and creation of two NTE. The outlay for this investment was made jointly by the Ministry of Education, through its own resources and loans. The provinces contributed 20%, and municipalities and the general public put in the remaining percent.

Argentina

As regards *RedEs*, in order for a mass action to be undertaken during this first year, agreements were made with the telephone companies for them to subsidize the largest part of communication costs. This would allow a large number of educational institutions to be connected all over the country without the need for a significant initial investment in data network development.

Additionally, schools will be benefited during 1999 with a telephone line installed for free, the subscription fee at the

rate of residential subscribers, and two-hour daily use at no charge. The registration fees and use of the data network is also provided for free. In order to ensure the resource availability, it was established that the line installed for *RedEs* will be used solely for such purpose.

As a long-term success criterion, the network is expected to achieve self-sustainability, along the lines of the decentralization promoted by the education reform. While this will introduce a higher administrative cost to organizations and institutions managing the network, closer control of the services rendered will be attained and a more flexible administration, more closely oriented towards its own objectives, will be possible.

Loans and private sector contributions also have a substantial role in the development of this project.

Conclusions

Technological development and improvement is an extraordinarily dynamic and expansive process rapidly pervading and modifying the customs of the whole society. Information and Communication Technologies (ICTs) are no exception and the level of their improvement demand changes in different areas, particularly in education.

As discussed in this paper, the need to incorporate ICTs has been understood by national authorities in the education area of Argentina, as well as those of Brazil, Chile, and Mexico and now they are all working towards their implementation within the teaching and learning process. The path found to reach such an objective is to apply government policies at the federal level, which also involves programs of extraordinary dimensions within education programs.

ICTs implementation generated curricular changes

The interconnection of computers in a network joining schools opens a number of possibilities worth analyzing.

The use of ICTs as a teaching aid demands a redefinition of the concept itself: the extraordinary availability of information supplies and specific programs that can be used in education poses new challenges to the entire pedagogic model. Education experts have been cautiously addressing this issue for some time already.

From the very moment plans are devised to introduce computers into the classroom or other study environments a fundamental change has to be envisaged, a response has to be thought out involving an all-encompassing modification of the teaching-learning process: from the principles to the methodology. And this is not just about introducing new ways to produce information but to establishing a new teaching method. The issue comes down to finding out to what extent the mere introduction of new teaching aids may be the seed for the change of a pedagogical paradigm.

ICTs as the driver of teachers' continuous improvement and academic exchange

One of the basic problems posed by this type of policy is that the training schemes projected at the national level demand extraordinary budget allocations. The dynamics of technological advance, in turn, make training in the use of certain tools difficult, time-consuming, and expensive to evaluate. It is clear, on the other hand, that beyond the schemes using multiplying teacher systems, which have an unparalleled effectiveness and economy, there are many other basic issues still to be defined: Is training oriented to teacher learning? If so, is it in order for them to be able to teach the use of such tools? Are they trained in the use of the resource in order to facilitate the performance of basic functions just for the school environment? This makes it necessary to plan how to integrate the problems associated with change for the new roles that technological progress allow to create as well as those related to basic training and continuous re-qualification.

Teachers have to be prepared to get into programs that give them the tools to establish new approaches to classroom work, irrespective of the redefinition such space is undergoing. Teachers must learn how to use the network to teach and they will also learn how to benefit from it in order to acquire new knowledge. ICTs incorporation will probably change the teachers' role as the main agents of knowledge dissemination. They will then have to start occupying other spaces in

a process, which is redefining its functions.

According to the above discussion on the programs themselves, we are in the first generation of training courses where means and technologies go no farther than making teachers familiar with these media and no longer-term objectives can be set as yet.

Networks will be a tool to achieve more homogeneous education plans and offer the same opportunities of study and access to information

All the plans for the union of educational institutions by means of information networks are devised to encompass the whole nation, thus bringing all educational communities in a country closer. Each of those communities, though, has its own peculiarities based, in principle, on the characteristics of the location (whether geographic, cultural, economic, political, and so on) and will bring such features into the network.

Interaction will allow knowing each other, exchange knowledge, and experiences but will also help globalize certain aspects, mainly those associated with education. Being part of the same educational system and united through a network simultaneously offering everybody the same possibilities of development gives everybody the same opportunities to grow. All will have access to information and then it will be up to each party how to capitalize on it.

Networks will make it easier to establish regional educational policies

Restricting our observation to Argentina and the countries surrounding it, they are all developing or projecting their interconnection to an information network.

In light of this situation, policies have to be established to foster cooperation and effective integration within the framework of regional agreements of various scopes. To this direction point the proposals of the Second Summit of the Americas, which included in its work line #8 the integration of ICTs to the education process as one of its basic goals in the cooperation. This can be understood to mean that initiatives will be gradually implemented ranging from technical cooperation for software design and management to interconnection and work for the production of educational software and contents common to the whole region.

Besides, if it was possible to conform an economic block as Mercosur, these other forms of integration can be accomplished too. Given the substantial investment required by these programs, the cooperation between nations is a must: in the form of incentives for regional industries to contribute their supplies, from the need that these policies bear fruit, in the form of research of the evolution of pedagogical models and technical resources. This possibility should not be thought for the long term, as technological development relentlessly evolves, day after day.

Of course, there exist some aspects that should be harmonized, such as the role of governments in the networks. For example, in Chile goods and services are being transferred, while in all the other programs, as their implementation set longer-term landmarks, support and funding commitment proposals have no precise terms. So, they can assume their responsibility in the sustaining of the program even though they might request support from public school cooperation entities, as is the case in Mexico.

In this issue Argentina shows greater flexibility as regards the manners. The government responsibility is basic and sustained but permanent assistance programs are integrated for the purpose of helping needy schools to get on with the project and the improvement and expansion of the services rendered is contemplated through funding the schools themselves can adopt.

Network content: an issue still to be defined

It is true that faults are noted, as regards projects and planning for the production of contents programs in school networks, and, for the time being, there is no consolidated industry producing educational software to satisfy the dimensions and the demand of these projects at all their levels. This is one of the most crucial issues to be solved.

Mexico has a tradition and an experience originated from the production of videotapes and TV programs for its educational channels. Chile is attempting to consolidate a most suggesting experience in the universities, while Argentina has been organizing the [Argentine Internet Olympic Games](#), which are just fledging initiatives that nonetheless signal to a trend as regards the creation of incentives for network content development.

References

[GIDD1983] Anthony Giddenns, La Estructura Social Moderna. Ed. Alianza. Madrid. 1983.

[DHAR1989] Ralph Dharendorf. El Conflicto Social Moderno, Ed. Península. Madrid. 1989.

[HOBB1988] Eric Hobbsbaun, Escritos sobre la Modernidad. Universidad de Buenos Aires, Buenos Aires 1988



Up



Prev



Next