



CHILEAN SCHOOLS: The ENLACES Network

Ernesto Laval and J. Enrique Hinostriza

Instituto de Informática Educativa - Universidad de La Frontera, Chile

In the early 90's Chile began an educational reform for its primary and secondary school system. Similar processes took place in many countries around the world,¹ adjusting education to the so-called "Knowledge Society" that was approaching at the end of the millennium.

Many aspects of the Chilean Educational Reform are similar to other reforms in the world: new curriculum, better infrastructure, text books, more teacher training, more learning time at school, etc. Nevertheless, there are some particular aspects of the Chilean context in the 90's that offer a particular flavor:

- Chile was initiating a democratic phase after a long period of military government. The three presidents elected since 1990 came from the same political coalition, and gave a high priority and continuity to the educational policies of the decade.
- The country had a relatively robust economy within the Latin American Region (GNP per capita of US\$4860 in 1996). This situation offered a good framework for funding a large and long-term effort in education.
- The 90's were marked with high political and social consensus on the priorities in education, which implied a national relation between the political system and education.²

All these factors allowed for the design and implementation of long term and consistent programs articulated around the Educational Reform. One of these programs was the Chilean initiative for introducing ICT in primary and secondary schools: the Enlaces Network.

ENLACES NETWORK

An important component of Chilean Educational Reform was the incorporation of information and communication technologies (ICT) into primary and secondary schools. At the beginning of the 90's there were no clear answers about how to conduct such a process in the whole country, but we knew

that the solution was not merely the massive provision of hardware. New technologies were seen as powerful artifacts that could act as new tools for improving and enhancing teacher practice within the school. Hardware provision needed to be part of a larger educational vision that included clear means for supporting teachers in the use of technology.

The initial vision was built around the construction of a National Educational Network, through which teachers and students could develop professional and pedagogical communities. This network was called *Enlaces*, which means 'links' in Spanish.

Teachers were expected to use technology to communicate with other colleagues, sharing problems and solutions, students were expected to participate in collaborative projects within their schools and with other schools, and computers were seen as a potential pedagogical tool that could support the teaching and learning process within the curriculum.³ In summary, technology was seen as playing several roles in education:

- **A pedagogical role:** Technology can support learning at school from a perspective of 'how' students learn (facilitating certain learning situations that would be more difficult without technology), but also from a perspective of 'what' students learn (learning some concepts or contents that are easier to understand through digital and interactive representations).
- **A cultural, social and professional role:** Computer networks can enable the formation of new communities of practice.
- **An administrative role:** Computers can be a powerful tool for facilitating management and data handling procedures within the school.

We were certain that it was important to have a clear vision of the roles of technology in education, but we were also certain that many change processes in education don't succeed if they don't get to an implementation stage: making it happen inside the school. This implementation stage implies

dealing with many variables that are hard to consider - or even be aware of - from a design desk. Some of the most challenging aspects of the implementation stage were: an appropriate relation with the school principal, a respectful approach to teachers, an appropriate professional development process, a good understanding of the power relation between schools and local authorities, etc.

Since we did not have the experience of implementing an ICT initiative in schools, the decision was to have an initial pilot stage working with a small number of schools (100 schools) during an extended period of time (5 years) before scaling up nationally. This is not an easy decision for a Ministry of Education, since working on a small scale in education is not popular and might not have high political revenues in the short term. Looking backwards we may say that it was a right decision for the long-term implementation of Enlaces.

ENLACES PILOT STAGE: 1992-1995

Enlaces began its pilot stage in 1992 working in educational and technical aspects of the implementation with just 3 schools in Santiago (Chile's capital city). In 1993, the project moved to a small city in the south of Chile - Temuco - in one of the poorest regions of the country. We took the decision of doing a pilot project in 'difficult' conditions, since if we could succeed there, then it would be possible to scale up to a national level. The team that coordinated the pilot project, and designed the later expansion, was based at the University of La Frontera, a small University in the city of Temuco, which became a key partner of the Ministry of Education in this national ICT program.

After 3 years we were able to build a network of over 100 primary schools that received hardware (computers, printers, modems), educational software, Internet connection and most important, a teacher training program that allowed teachers to use technology. The decision then was to expand at a national level, building on the experience gained in the past three years. The main lessons from this period were:

- **Make it simple for the users**

Teachers were not coming from an ICT culture. Computers, operating systems, software modems and even keyboards could be powerful tools, but they could also be huge barriers for the adoption of technology. From the beginning, Enlaces tried to focus the tasks that teachers could achieve with computers, and not the mastery of the computer as an end.

It was decided to buy the easiest-to-use hardware and software at that time (graphic user interfaces, easy to set up systems, etc.). This could seem to be an expensive choice in terms of hardware cost, but turned out to be a cost-effective solution in terms of usability. An easy to use graphic software environment was also developed - *La Plaza* - which allowed users to engage in meaningful tasks at the computer within a few hours, even if they had never seen one before. (see *Figure 1*)



Figure 1. *La Plaza* Interface

La Plaza (which means 'the central square') was a graphic representation of a common place for Chilean - and Latin American - culture. Most Chilean towns have a central square, which is the place where important



Figure 2. Interface: The Post Office, the Kiosk and the Cultural Center

things happen in the town: people meet at the Plaza, the Post Office is near the Plaza, important buildings are close to the Plaza, etc. Our computer Plaza was a point and click image, where users could go to a Post office (for sending emails), to a News Kiosk (for reading news), to a Cultural Center (for participation in interest groups), and to a Museum (for accessing software and information). (see *Figure 2*)

- **Focus on Teacher Training**

A key dimension of Enlaces work was "training teachers". The University that was conducting the pilot project established a teacher training team composed initially of university staff, but later made up mainly of teachers coming from the first schools in the project.

Teacher training was organized around regular sessions conducted with teachers in their own schools for a period of two years. The first year was oriented mainly towards the use of the computer and software (electronic mail, word processor, electronic spreadsheet, painting programs, educational software), and the second year focused mainly on the pedagogical application of technology (collaborative learning, curricular projects, etc.).

- **Organizational aspects**

It was very important for the development of the project to have a good organizational structure that offered a balance between political decisions, design capacities, national articulation, trust, implementation efficacy and funding. This balance was achieved through the partnership established between the Ministry of Education and the University.

ENLACES NATIONAL EXPANSION: 1995-2000

One of the most critical moments in a project's implementation is when it has to grow from a small - and controlled - pilot project to a massive, large scale, national program. Enlaces faced this challenge in 1995, when it began a national expansion to the primary education system and at the same time it started a national implementation in the secondary school system.

A key issue for facing this expansion was the creation of the 'Enlaces National Support Network' that involves a partnership between the Ministry of Education and more than 24 Universities through the country. Following the scheme adopted for the pilot stage, 6 universities constituted specialized groups of people that would be in charge of providing professional development, technical support and development of materials at the regional and local levels. Each of these universities became a 'Zone Center', which was responsible for the implementation of Enlaces in a geographical

zone. Within each zone, the Zone Center established, in turn, agreements with other universities and institutions - 'Implementation Units' - in order to cover all the geographical regions of the country with a local presence.

Along with the Enlaces National Support Network, the Ministry maintained a partnership with the Institute for Information Technology in Education at the University of La Frontera, which had conducted the pilot stage. The National Coordination of the project was established at the Institute (in coordination with a team at the Ministry), as well as a Research and Development Center, which supported the Ministry in the design of future steps of Enlaces.

This National Support Network was central to the expansion due to some key factors:

- The implementation of Enlaces in the schools was the responsibility of institutions that knew the local schools' reality.
- Institutions appropriated this national initiative as a shared challenge. It was not just the implementation of an official policy from the government, but the implementation of a program felt as belonging to the whole country.
- A network of specialized teams thinking, reflecting and having direct experiences with technology in schools was established.
- The universities worked with school teachers for training teachers in schools (peer tutoring). This promoted the development of a national network of teacher trainers.

RURAL ENLACES: ICT IN SMALL RURAL SCHOOLS

The early years of Enlaces, and the later national expansion, was built on a design for large urban schools: arrangement of computers within a special computer room, training groups of 20 teachers in weekly sessions at their own school, Internet connectivity through the telephone network, frequent technical support, etc.

Almost 90% of Chilean students go to these 'urban' primary or secondary schools. The other 10% of the students attend small rural schools, with a very different context. Some of the most salient characteristics of rural schools are as follows:

- They have a small population of students (an average of 27 students per school).
- Several classes are taught by the same teacher in one classroom (66% have just one teacher).
- In spite of the fact that a small proportion of the national population attend rural schools, the number of these schools is relatively high (there are more than 3,300 ru-

ral schools, more than one third of all the schools in the country).

- Most rural schools are located in places with difficult access (no public transportation).
- About 10% of rural schools do not have regular access to electricity.
- About 80% of rural schools do not have telephone communication.

The Ministry of Education has a special program for working with rural schools since 1992. This program involves methodological and organizational approaches that are suitable for mixed grade classes, and monthly meetings with teachers from nearby schools constituting a community of teachers called *Microcenter*.⁴ Within this context of Rural Education, in 1999 Enlaces designed a special ICT program: *Rural Enlaces*.⁵ This program involved a different organization of resources within the school (computers arranged as learning corners inside the classroom), and a different teacher-training program.

Rural Enlaces constituted a network of teams within the Zone Centers that were dealing specifically with ICT introduction in rural schools. These teams work with rural teacher trainers - called *facilitators* - that visit each school once a month and work with the teacher and students inside the classroom, modeling different approaches to the incorporation of technology in pedagogical activities. Besides these 'in-classroom' sessions, the facilitator meets with all the teachers from nearby schools once a month in their already established Microcenter meeting. The first year, teachers also participate in special intensive workshops at the closest University, learning basic skills related to the use of computers and software. This professional development program is seen as a progressive process that takes 3 years, after which they keep a permanent basic support link with the Enlaces Support Network.

In terms of connectivity, it was decided to begin Rural Enlaces with a focus of the pedagogical use of technology inside the classroom even if the schools did not have Internet access. In parallel, there is a task team designing a national solution for providing sustainable Internet access to all the rural schools - and communities - in the following years.

ENLACES' ACHIEVEMENTS BY THE YEAR 2002

By the year 2002 more than 7,300 primary and secondary schools have been incorporated to Enlaces. Each of these schools received computers, local networks, educational and productivity software and free and unlimited Internet access. Additionally, the Ministry of Education, in a partnership with

Enlaces National Support Network, provided technical and pedagogical support to each school.⁶

In summary, the implementation of the *Enlaces* educational network has involved the following:

- Providing three years of training to twenty teachers per school, for an approximate total of 80,000 teachers (70% of all teachers).
- Reaching 72% of the schools, thus covering 97% of the student population attending state-subsidized institutions.
- Supplying 51,000 computers to schools, allocated according to the number of students in each school. The equipment - chosen according to annually updated technical standards - includes multimedia computers, printers, modems and a local area network. Considering this equipment and the ones purchased by each school, the students/computer ratio in the country is 42.
- Equipping schools with educational software to support their study programs. Annual bidding is held to supply schools with this material. The software includes productivity applications such as word processing, spreadsheets and graphics programs, along with educational software on topics such as the human body, space, science, math, geometry, scientific experimentation, Chilean history, world history, geography, literature, music, art, drama, physics, chemistry, the environment, etc.
- Creating a Web site (www.educarchile.cl) that offers a wide range of useful educational content and services for teachers and students. This site was conceived as an educational portal where teachers can find relevant and useful curriculum-oriented content (digital educational resources), forums on relevant issues and up-to-date education information (news, events, etc.).
- Introducing ICT as a built-in part of the new curriculum for secondary schools. The use of ICT was defined as a transversal aim in the curriculum, indicating thereby that it should be used in all the core subjects (Language, Math, Science, etc.) and not as a subject by itself.

A crucial step in the development of Enlaces was the Agreement that the Ministry of Education negotiated with one of the largest telephone companies in the country - Telefonica CTC Chile. The company agreed to provide telephone lines, email accounts and dialup Internet at no cost for a period of 10 years to all the schools in the regions where the company had a telephone network (the majority of the Chilean Schools).

EVALUATION RESULTS

In general terms, the results of the evaluations of the effects of *Enlaces* done at an early stage of the project⁷ (between 1993 and 1997), coincide to show positive outcomes in learning (students increased their reading capacity and their comprehension levels) and psychological effects (students

improved their creativity, self-esteem, and concentration capacities). These results are congruous with results of qualitative evaluation, indicating that technology produces a high level of motivation among students, generates a more horizontal social organization within the classroom, and enables students to feel proud of their participation in projects, with a corresponding increase in self-esteem.

From the point of view of **teachers**, the comparative evaluation made of programs introducing computers into the educational systems in Costa Rica and Chile⁸ showed that Enlaces is a source of pride that opens doors for professional development, especially among teachers. School officials also valued the increase in equity that the project provides by outfitting schools with equipment that they otherwise would not have been able to acquire. However, a main concern among teachers is the heavy unpaid workload resulting from their participation in the Program.

From a general perspective, evaluations made by the World Bank,⁹ UNESCO¹⁰ and the U.S. Agency for International Development¹¹ coincide to highlight the Enlaces project as one of the successful programs in the Chilean Educational Reform. An important point in this positive evaluation is that the project has expanded its coverage to the national level without sacrificing quality or equity. Among the factors in this success, they mention the program's focus on teachers, the construction of a social network of educators and pupils facilitated by user-friendly technology and decentralized support, and respect for participating schools' autonomy and their decisions in the use of the program's technologies.

ENDNOTES

¹ Fullan, M., *The new meaning of educational change*. 3rd ed. 2001, New York: Teachers College Press. xiv, 297.

² Cox, C., *La Reforma de la Educación Chilena: Contexto, Diseño, Implementación*. 1997, PREAL: Santiago, Chile.

³ Hepp, P., *Enlaces: Todo un mundo para los niños y jóvenes de Chile*, in *La reforma educacional Chilena*, J.E. García-Huidobro, Editor. 1999, Editorial Popular: Madrid. p. 289-303.

⁴ San Miguel, J., *Programa de Educación Básica Rural*, in *La Reforma Educacional Chilena*, J.E. García-Huidobro, Editor. 1999, Editorial Popular: Madrid.

⁵ IIE, *Enlaces Rural "La informática como un recurso de aprendizaje para todas las escuelas rurales de Chile"*. 2000, Universidad de La Frontera: Temuco.

⁶ Laval, E., *Informática Educativa en Chile: Experiencia y proyecciones de la Red Enlaces*. Persona y Sociedad, 2001. XV(2).

⁷ The methodology considered a quasi-experimental design with chronological series using successive pre and post tests. The sample consisted of 52 primary schools (10,500 students) and 49 secondary schools (5,600 students).

⁸ Potashnik, M., Rawlings, L., Means, B., Alvarez, M. I., Roman, F., Dobles, M. C., Umaña, J., Zúñiga, M., & García, J., *Computers in Schools: A qualitative study of Chile and Costa Rica*, in *Education and Technology Series Special Issue*. 1998, World Bank Human Development Network: Washington D.C.

⁹ Ibid.

¹⁰ Núñez, I., *El Proyecto Enlaces (Chile), un estudio de caso*. 1996, UNESCO.

¹¹ Rusten, E., Contreras-Budge, E., Tolentino, D., in *Learnlink Case Study Summary. "Enlaces: Building a National Learning Network"*. 1999, Global Communication & Learning Systems. US Agency for International Development. Available in: <http://www.aed.org/learnlink>.

ENLACES: NEXT STEPS

We recognize that the task is far from being completed. We had provided just a basic *seed* that allowed schools and teachers to recognize the potential benefits of ICT. Technology has already been incorporated into the school culture, but it has not really incorporated into teachers' regular teaching practice. If ICT is to make a contribution to teaching and learning practices, we still have a long road to follow. The next steps of Enlaces are directed towards the effective Curricular Integration of ICT. Several task teams are working on priority areas (particularly basic skills of Literacy and Numeracy in primary education), not only trying to understand the potential benefits of technology, but more importantly the key knots in teaching and learning within the disciplines. That is, we are trying to answer the question: *where and how can technology help the teaching and learning process within each discipline?* The main idea is that we are not just providing resources and training, but that we have to design 'modes of action' for teaching with the use of technology, as mediators in the teaching process in the domains where technology can have an impact.

We still have more questions than answers for the next steps in Enlaces, but we do know that this is not a neatly designed 'single shot' intervention, but a long term process in which we will have to continue working with schools and the national - and international - community to build new understandings and support networks for incorporating ICT for the enhancement of our students' learning.