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# Building and sustaining national ICT/education agencies:

# *Lessons from Chile (Enlaces)*

*World Bank Education, Technology & Innovation:*
*SABER-ICT Technical Paper Series (#07)*

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# Acknowledgements

The *World Bank Education, Technology & Innovation: SABER-ICT Technical Paper Series* explores a variety of topics and issues related to the use of information and communication technologies (ICTs) in the education sector.

The Systems Approach for Better Education Results (SABER) initiative seeks to improve the global knowledge base related to education systems analyses, assessments, diagnoses, and opportunities for dialogue. SABER-ICT aims to improve the availability of policy-related data, information, and knowledge on what matters most in using ICTs to improve the quality of education.

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# Executive summary

The *Enlaces* program has been responsible for the implementation of projects exploring the use of new technologies in education in Chile for over two decades. Born in 1992 as a small pilot project, Enlaces grew and evolved over time to become part of the permanent structure of the country's Ministry of Education. Its implementation strategy can be characterized as one 'from the periphery to the center', both in its territorial deployment and in the manner in which it was gradually institutionalized.

The main focus of Enlaces has been to support the computerization of schools and to support teachers to incorporate the technology into their teaching practices. For most of its history, Enlaces has enjoyed committed political and financial support from Chile's national education authorities. From its inception, Enlaces has been built on strategic alliances with regional universities, schools, and the private sector, each of which has played a leading role in the development and success of Enlaces. The program's commitment to follow a 'logical path', by supporting traditional structures and actors within the education sector, resulted in a slower implementation of new technologies in schools than in many comparator countries, and over time the program struggled to demonstrate significant impacts on educational outcomes, as traditional educational practices did not change significantly. As its program became institutionalized within the Ministry of Education, Enlaces became more embedded within, and dependent on, official bureaucratic structures and education policies, constraining the ability to innovate and remain flexible which characterized its early years.

# 1. Setting the stage for Enlaces: Context

In the early 1990s, the Chilean government initiated a transition to democracy under President Patricio Aylwin. Sustained spending growth on education – at a level above growth in GDP – had characterized the Chilean economy for over 90 years. Aylwin sought to redefine the role of education in achieving solidarity and a more just society, as well as to redefine the status of the teaching profession – something that challenged some of the statutory provisions which had traditionally provided various protections for teachers.

With quality and equity the dual educational priorities for the new democratic government, a new project, "Programs Improving Equity and Educational Quality" (MECE), was introduced with support from the World Bank.[1] Global movements and trends to explore the uses of emerging information and communication technologies (ICTs) to help meet developmental objectives resonated with key figures on the technical staffs of agencies in the new government. In this context of political and social change and high expectations related to the potential utility of ICTs in education, a small pilot project began at School E-209 in Santiago to explore potential uses of computers in education. The project was led by a multidisciplinary group of researchers from the Catholic University of Chile, consisting of engineers, teachers and psychologists, in partnership with the Ministry of Education. This general model, where professionals from different disciplines led a small pilot project before proceeding with an activity at a larger scale, informed the evolution of educational technology efforts in Chile in subsequent years.

As part of the negotiations with the World Bank to fund the MECE – the first major intervention of the new democratic government in the education sector – national authorities expressed an explicit desire to integrate educational computing within the larger package of new measures and initiatives aimed at ensuring quality and equity in education in Chile.

The development of Chile's national program to introduce new technologies in education – *Enlaces* ("links") – can be divided into three stages: from its origins to 1995; between 1996 and 2005; and after 2005. This paper will consider each of these stages in turn.

[1] *Cox, C. (ed.) (2003). Políticas educacionales en el cambio de siglo: La reforma del sistema escolar de Chile. Santiago: Editorial Universaitaria.*

## 2. From a public policy experiment to a national program (pre-1995)

The Enlaces program was officially created by the Ministry of Education in 1992 during negotiations with the World Bank related to MECE. The founding mission of Enlaces was to improve the quality of education by integrating educational computing across the school system, according to the needs of the emerging 'information society' and to promote the development of a 'digital culture". Specifically, a national educational network comprising all government-subsidized schools utilizing ICTs was to be established.

The vision of Enlaces was typical of its young team, mainly drawn from the world of academia, which advocated for a *gradual* appropriation of new technologies by Chilean teachers as the approach most likely to succeed. One of the foundational decisions was to focus initial activities outside of the capital city of Santiago and to associate closely with a university. As a result, Enlaces began in 21 schools in 1993 in Chile's ninth region of Araucanía, one of the poorest regions of the country which had a high rural population, including many people who belonged to the majority indigenous population of Chile, the Mapuche. The project was led by a group of professionals who, two years later, would create the Institute of Computer Education at the University of La Frontera. "If it worked in Temuco, then it could work anywhere in Chile",[2] recalled one of the project's early leaders, and the variety of challenges confronting the project in this region were seen to be broadly relevant to a representative of many related key challenges across the country.

In support of the MECE project, Enlaces deployed necessary network infrastructure, ICT equipment, software and corresponding digital learning resources. The implementation strategy focused on promoting teaching with the use of technology, training teachers, providing workshops for students, providing digital educational resources and infrastructure to enrich the curriculum, and providing teachers with new teaching tools. According to Pedro Hepp, the first director of Enlaces, an important decision guiding the program in its first stage was that computers would be *a means, and not an end*, so that the goal would be to *learn with* computers. The integration of urban schools in the cities of Temuco and Santiago into Enlaces occurred alongside the expansion of the project into smaller cities and rural schools, including (in 1996) to some of the country's most remote regions.[3] This expansion was enabled by linkages to regional support networks centered around local universities. As the program grew to encompass 183 schools and became more connected with multiple regions and universities, the largely unstructured institutional relationships between organizations which characterized the early days of Enlaces slowly solidified and were formalized. This introduced some restrictions and rigidities into the project, constraining somewhat the great deal of management autonomy with which Enlaces operated in its early years.

Beginning in 1995, preparations began for national expansion of the program. The program was meant to grow 29 times larger in a period of five years to encompass over half of the schools in the country -- even including schools in remote regions like Easter Island and Antarctica.

[2] *Entrevista a Pedro Hepp, Director de Enlaces 1992 - 2000 [Santiago, 24/8/2007].- en Enlaces, "El Libro abierto de la Informática Educativa", Centro de Educación y Tecnología del Ministerio de Educación, 2010.*
[3] *Enlaces. (2004). Proyecto Enlaces Expandido. Santiago: Ministerio de Educación de Chile.*

# 3. Expanding Access (1996-2005)

Chile's new government, led by Eduardo Frei Ruiz-Tagle (1994-2000), initiated major changes in Chile's education system as part of a new educational reform process. New government programs presented a new set of operational challenges for Enlaces, especially related to *scale*. New strategic and operational partnerships with both academia and, increasingly, private companies, were developed. Large tenders for the purchase of hardware and educational software began. Telefónica CTC Chile offered free Internet access to schools beginning in 1998, and in 2001 Fundación Chile supported the development of an online educational portal.

The Ministry of Education assumed that computers and information networks were increasingly present in all areas of human activity, and a redesign of the curriculum to reflect this reality was initiated. Enlaces became a much more visible presence in schools with the inclusion of computer education in the curriculum of secondary education. Critically important to the growth of Enlaces in this period was strong support from the Ministry of Education and in the Treasury, which meant that the program was largely sheltered from the effects of the global economic downturn that began in 1997.

In 1996, the Technical Assistance Network Enlaces (RATE) was born. RATE, a partnership between the Ministry of Education and a group of universities, was new and unprecedented within the history of Chilean education. Six universities were designated as “zonal centers” and in turn coordinated with 18 other universities, which served as executing units within Enlaces. RATE provided technical and pedagogical training for teachers, enlisting trainers specialized in educational computing in primary and secondary schools. The fact that Enlaces utilized such specialized teachers proved to be very motivating for teachers, as it enabled a regular dialogue with professionals who had received the same training. Additionally, the program distributed educational resources, applications, software and educational sites -- all selected for their educational value to support teaching -- on CD-ROMs every year to all schools in the network.

Growth meant that Enlaces had to place a higher priority on its management structure. The large increase in the number of teachers and schools involved in the program, and the large tenders for procuring hardware and software, made the undertaking increasingly complex. While national coordination of the program remained headquartered in a regional university (Universidad de la Frontera), the increased budget and increasing visibility of the project required closer coordination and support from the Ministry of Education. Videoconferencing links were established to facilitate more regular dialogue between the management team in Temuco with the Ministry, other state agencies and the private sector based in Santiago.[4] The core teams in Temuco and Santiago grew in number and complexity.

In 2000, under the new government of Ricardo Lagos Escobar (2000-2006), the Enlaces team moved to Santiago and decision making was centralized. At this point, Enlaces had a presence in all urban schools, and focus increased on expanding the program to the remaining rural schools not yet participating in the program.

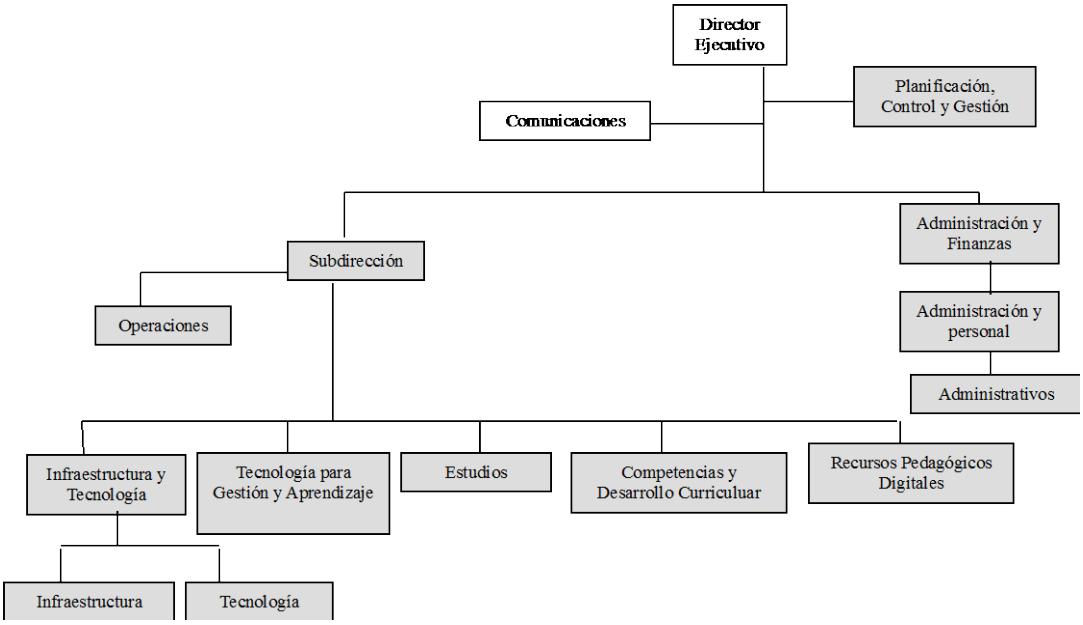
The partnership with Fundación Chile that began in 2001 enabled the creation of national educational portal (Educarchile), merging many separate educational sites into an autonomous portal, in collaboration with public, private and philanthropic partners. This relationship allowed access to new financial resources and alliances with third parties, as

[4] *Hepp, P. (2003). “Enlaces, el programa de informática educativa de la reforma educacional chilena en políticas educacionales en el cambio de siglo”, in: Ed.Universitaria. Santiago de Chile 2003: Mineduc.*

Fundación Chile had a large amount of institutional flexibility and was not tied to the rigidities of the public system. That said, tensions associated with growth brought with it new challenges related to how the Ministry of Education, the Enlaces program and Fundación Chile were publicly recognized for their work.

The challenges of Enlaces leading up to 2006 focused primarily on completing the program's coverage in all rural areas, including both hardware and software distribution as well as the training of teachers, with a major emphasis on the provision of digital educational resources.

***figure 1*. Enlaces organizational structure (2007)**



# 4. Integration into teaching and learning — and the demand for impact (post-2006)

For its first dozen years, Enlaces functioned as an educational technology project embedded within a larger national strategy in Chile to improve equity and the quality of education. Beginning in 2006, the program was transformed into the 'Education and Technology Center of Chile -- Enlaces', with its functions and structure strengthened and centralized under the Ministry of Education. The stated objectives of this 'new' Enlaces were to provide "support to schools to make classes more effective, develop new ways of learning, and develop digital skills in teachers and students". Enlaces was to play a leadership role coordinating public policy related to educational computing and to play an active role in promoting digital literacy of Chilean citizens. As a practical matter, this meant that there was now a greater emphasis on educational and learning practices than on the distribution of ICT equipment, and the management of Enlaces had greater autonomy over its own activities. At the same time, favorable economic conditions associated with high international copper prices – Chile has long been the world's highest producer of copper – helped accelerate a great expansion in Enlaces between 2007 and 2010. With the expansion of the activities of Enlaces came new tensions, especially as there were now greater pressures for Enlaces to demonstrate that its work was resulting in better learning outcomes.[5]

While Enlaces is credited with helping to bring about more favorable social attitudes related to the use of new technologies in schools, within Chile itself, concerns grew about the potential negative impact of such technologies across Chilean society. Questions were raised about whether the rapid growth in the availability of new technologies was actually helping to raise the quality of life for Chilean citizens. While Enlaces was lauded for its efforts to expand access to computers and the Internet within schools, it was also noted that this increased access did not bring about corresponding growth in achievements on international examinations such as TIMSS.[6] Was ICT use in schools contributing to higher quality learning? Researchers were not sure.

At the same time, a growing movement of discontent with the quality of education in Chile was emerging, expressed in mass protests and the increasingly mainstream perception across the country that, despite the investments that had been made, students -- especially those in public publicly-subsidized schools that educate 90% of all Chileans -- had serious difficulties in achieving satisfactory results in national and international tests. This meant that education policies were increasingly focused on other areas (institutional reforms, targeted programs, better working conditions for teachers, changes in higher education), which resulting in a diminished visibility and political priority for educational technology initiatives like Enlaces, even if such programs still accounted for a high percentage of investments in the education sector.

Changes in project leadership teams, changing institutions, increased expectations for student achievement, and an increase in funding for Enlaces meant that the program was going to face significant new challenges in the coming years. In 2008, a new national plan, "Technologies for Quality Education" (TEC), aimed to increase the educational use of technology in schools, especially at the classroom level. A 'new deal' was established

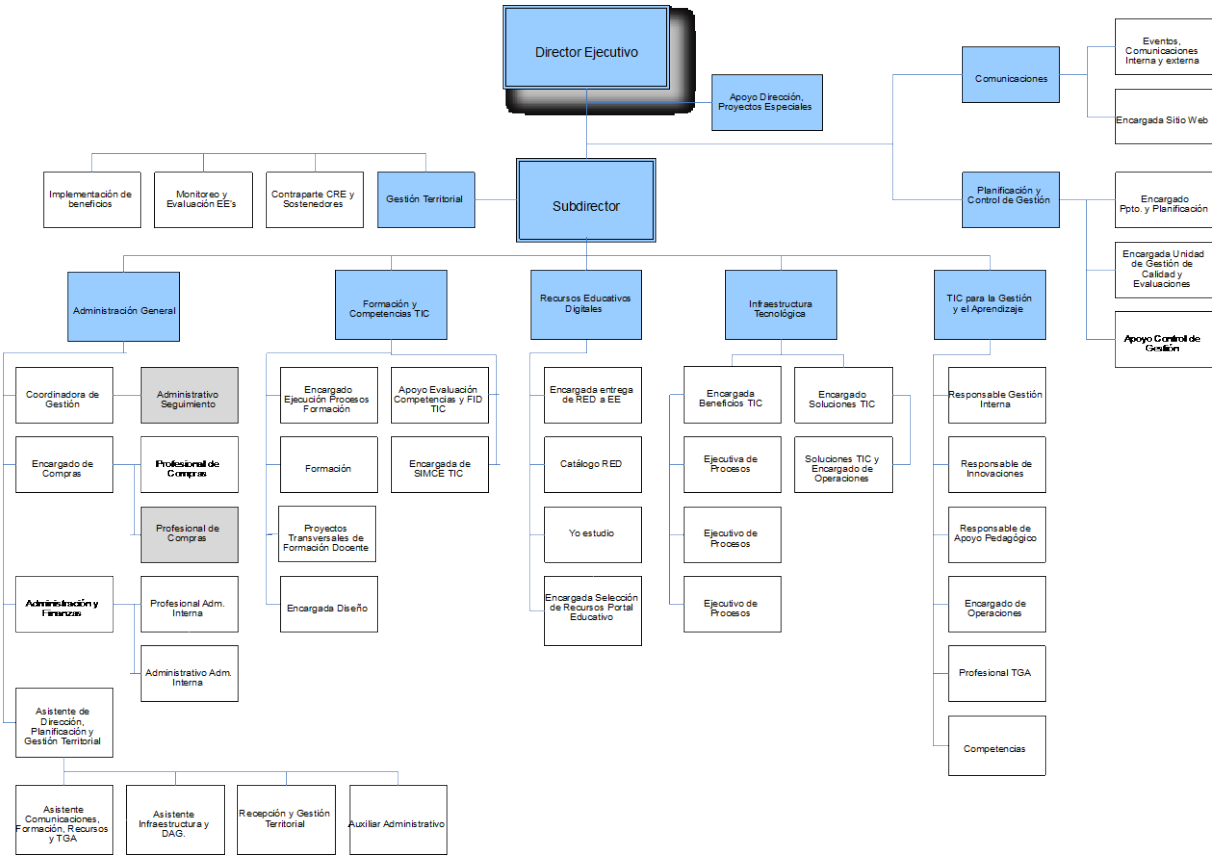
[5] *Rosas, R., Cox, C., & Saragoni, C. (2002). Evaluación de la Apropiación y Uso de Recursos Tecnológicos del Proyecto Enlaces por parte de las Unidades Educativas. Santiago: Pontificia Universidad Católica de Chile, Escuela de Psicología.*

[6] *Programa de las Naciones Unidas para el Desarrollo (PNUD). (2006). Informe sobre desarrollo humano 2006: más allá de la escasez: poder, pobreza y la crisis mundial del agua. Madrid: Mundi-Prensa Libros; Cancino, V & Donoso, S. (2004). "The educational computer program Chilean educational reform: A critical analysis", Revista Iberoamericana in Education, No. 36, 2004.*

between the Ministry and participants and stakeholders in the Enlaces program, whereby the Ministry committed to provide technical computing facilities while other groups became responsible for their installation and maintenance. In 2009, the Digital Educational Resource Catalog (RED) web site offered schools and colleges a tool to understand and select digital resources to support the implementation of their own educational plans. A pilot Mobile Computer Laboratory (CML) project introduced '1-to-1' computing for students via the introduction of mobile pushcarts that could be shared between classrooms in 1500 municipal establishments.

In early 2010, a massive earthquake rocked Chile. As a result, the first priority of much of the education sector focused on reconstruction. Building on earlier investments under Enlaces, an online training program (www.yoestudio.cl) functioned during this period to help reach teachers and students in affected zones and functioned in many ways as an online or 'virtual' school. In November 2011, a new ICT-related assessment was added to the national SIMCE examination scheme, further demonstration of how ICTs were being integrated within the Chilean education system. That said, around the same time a new wave of student protests began, and Enlaces began to feature less prominently in Chile's overall educational policies.

***Ffigure 2*. Enlaces organizational structure (2011)**



# 5. Conclusions and moving forward

The original objectives of Enlaces were met: Almost all Chilean schools had access to computers and the Internet; teachers, students and families did as well; and many digital educational resources became widely available. The program was especially successful in promoting equal access to students in poorer and more remote communities.

The most significant achievements of Enlaces include:

- *Reducing the digital divide among teachers.* By 2012, it was estimated that Enlaces had managed to train almost all Chilean teachers in the basic use of ICT. That said, important challenges remain related to supporting the ongoing of teachers over time, and, more importantly, the development of skills related to the use of ICTs within existing specific learning contexts.
- *Reducing the digital divide among students*. A survey in 2004 noted that 85% of students went to schools where computers and the Internet were in use, regardless of the quality or nature of the school or the socioeconomic status of its students.[7] The figure grew to 96% in the 2006 survey, and 99% in the 2009 census.
- *Reducing the digital divide in families*. Enlaces helped introduce the tools of the digital age to parts of the Chilean population which were not -- largely because of socio-economic factors -- participating in the expanding and increasing dynamic markets for ICT products and services.
- *Improving perceptions related to the use of ICTs in education*. Today there is a high demand for ICT use throughout the Chilean education system, which suggests that circumstances are potentially favorable for the introduction of new education policies that can take advantage of these technologies.

Enlaces began as a small team of dedicated and highly motivated professionals who operated at the margins of the Ministry of Education, and in close collaboration with academia. In its early years, program enjoyed broad levels of autonomy to innovate, and its leaders took advantage of this freedom and flexibility to innovate. As Enlaces developed, it became more 'institutionalized', a phenomenon that brought with it enormous advantages related to funding; coordination across government ministries; greater access to high level education decision makers; a larger geographic footprint across the country; and greater legitimacy with individual school leaders. At the same time, this had some drawbacks as well, as reflected in a growing difficulty to develop bold and innovative strategies; an increased bureaucracy; a slowness in the development of design processes and the implementation of projects; and more dependence on larger government policy cycles and priorities.

Going forward, the program today faces two key challenges if it is to stay relevant and important within the country's larger educational context and policies:

1. *Greater emphasis on aligning educational computing policies and practices with national educational policies to achieve better learning outcomes.*

The challenge of access within schools to ICTs is largely considered to have been 'solved' in Chile. Chilean teachers today have a generally positive view regarding the use of technology; students and families consider that technologies are an important part of the training process in schools. Challenges remain, however, in utilizing new technologies to help change traditional teaching and learning practices in ways that are positive and impactful. In most Chilean schools, available technologies are used far less than might be

[7] *Data courtesy of the Education and Technology Center of Chile – Enlaces (2005)*

expected, given their relative abundance. Where they are being utilized, such use largely supports traditional educational practices, rather than encouraging and enabling innovation.

2. *A more flexible and lightweight organizational structure, better connected to sources of innovation and international experience.*

While its incorporation within the Ministry of Education allowed Enlaces to grow in size and legitimacy, it also took the program away from the flexibility and innovation that characterized its activities in its early years, when it was closely linked with local universities and efforts within individual regions.

What is the 'best' organization model for Enlaces going forward? Is it possible to regain some of the early momentum that characterized Enlaces in its 'start up', phase, embracing and promoting the development of pilots and evaluations, as well as possibly exploring the potential relevance of ICT use to emerging alternative educational models, while at the same time maintain the high level political support, organizational linkages and funding necessary so that it can have an impact at scale across the education system? As the worlds of education and technology continue to evolve, so to must the structure and activities of Enlaces evolve to help meet them.

# Annex: Data

***table 1*: Enlaces: Student-computer ratio**


***table 2*: Enlaces: School connectivity**

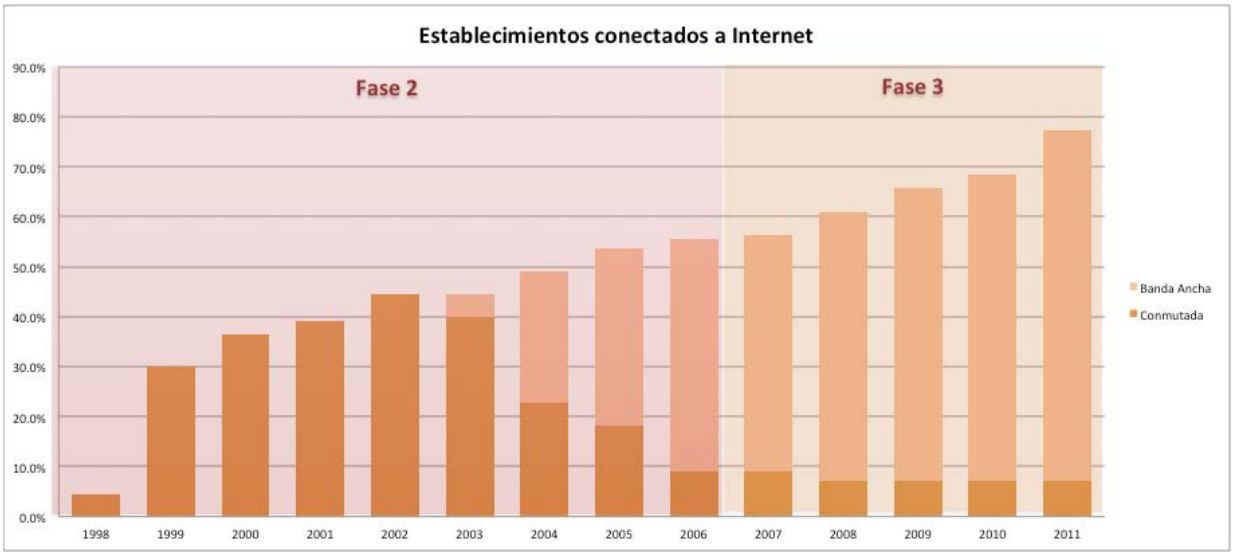


***table 3*. Enlaces: Budget**

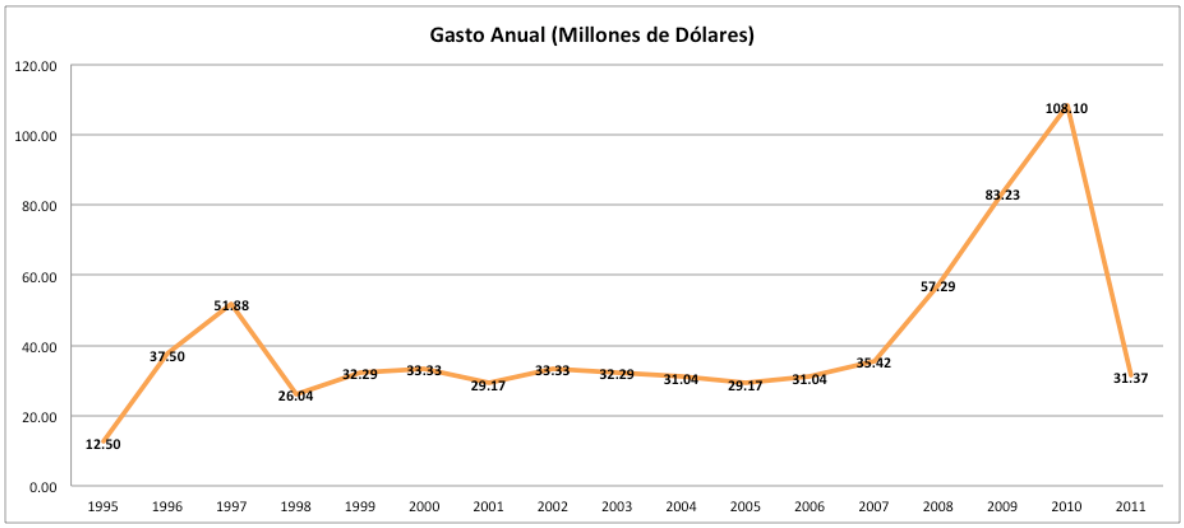



***table 4*: Enlaces: Coverage**

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